

**COMMENT LETTERS REGARDING APRIL 30, 2004  
PROPOSED BASIN PLAN AMENDMENT AND STAFF REPORT FOR MERCURY IN SAN  
FRANCISCO BAY**

(in alphabetical order by organization)

Partnership for Sound Science in Environmental Policy, Craig Johns

Port of Oakland, Jim McGrath

San Francisco BayKeeper/WaterKeepers, Sejal Choksi

San Francisco Public Utilities Commission, Michael Carlin

San Jose, City of, Carl Mosher

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), Adam Olivieri

Santa Clara Valley Water District, David Chesterman

Santa Clara, County of, Office of Development Services, Steve Homan

Santa Clara, County of, Parks and Recreation Department, Lisa Killough

Save the Bay, David Lewis

Seyfarth Shaw (Guadalupe Rubbish Disposal Co.), Todd Maiden

South Bayside System Authority, James Bewley

Sunnyvale, City of, Marvin Rose

U.S. Environmental Protection Agency, Alexis Straus

United States Geological Survey, Alexander Wood

Western States Petroleum Association, Kevin Buchan

*Note: Comment letters for organizations that start with A Through M are in a separate PDF file.  
-To access a specific comment letter easily, click on "Bookmarks" to the left.*



**Partnership for  
Sound Science  
in Environmental  
Policy**

Bay Area Clean  
Water Agencies

Bay Planning Coalition

California Alliance  
for Jobs

California Association  
of Sanitation Agencies

California Council for  
Environmental &  
Economic Balance

California Manufacturers  
& Technology Association

Chemical Industry  
Council

Contra Costa Council

Oakland Metropolitan  
Chamber of Commerce

Pacific Merchant  
Shipping Association

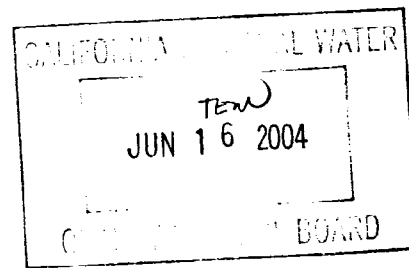
San Leandro  
Chamber of Commerce

Tri-TAC  
Sponsored by:  
League of California Cities  
California Association of  
Sanitation Agencies  
California Water Environment  
Association

Western States Petroleum  
Association

Craig S.J. Johns  
Executive Director

June 14, 2004



Dr. Thomas Mumley  
Planning and TMDLs Division Chief  
San Francisco Bay Regional Water Quality Control Board  
1515 Clay Street, Suite 1400  
Oakland, California 94612

**Re: Comments on the "Mercury in San Francisco Bay Total  
Maximum Daily Load (TMDL) Proposed Basin Plan  
Amendment and Staff Report" dated April 30, 2004**

Dear Dr. Mumley:

The Partnership for Sound Science in Environmental Policy (PSSEP) appreciates the opportunity to comment on the San Francisco Bay Regional Water Quality Control Board's (Regional Board) April 30, 2004 *Mercury in the San Francisco Bay Total Maximum Daily Load (TMDL) Proposed Basin Plan Amendment and Staff Report* (Mercury TMDL) (hereafter, "April 2004 Draft"). PSSEP is an association of San Francisco area and statewide public and private entities – businesses, municipal wastewater treatment agencies, trade agencies and community organizations. PSSEP was founded on the overriding principle that federal, state and local environmental policy decisions should be predicated on sound, objective science.

PSSEP commends your staff for their efforts in dealing with mercury and its methylation in a complex ecosystem. The Mercury TMDL clearly articulates the science used to develop the TMDL and its limitations. We support the adaptive process to refine the TMDL as additional information becomes available.

However, we were extremely surprised and disappointed to see the significant changes in the implementation plan for point sources contained the April 2004 draft Mercury TMDL as compared with the June 6, 2003 draft ("June 2003 Draft"). Frankly, we question the derivation of these changes, as well as the purpose behind making them at this stage, particularly given their stark contrast to prior drafts, as well as the impending date to adopt the Mercury TMDL. None of the members of PSSEP, including those that participate in the Clean Estuary Partnership, were aware that any of these changes were being considered. PSSEP is very disheartened at the Board's lack of communication and cooperation with the regulated community.

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We believe the changes contained in the April 2004 Draft can and will have significant negative impacts on point sources without any noticeable improvements to the Bay. The April 2004 Draft recognizes that wastewater treatment plants, as groups, "perform well and load reductions would incur substantial costs and contribute little to the overall load reductions needed to meet the proposed targets." (p. 53). In fact, the Mercury TMDL states that reducing wastewater discharges could cost from between \$87 million and nearly \$1 billion, yet fails to detectably accelerate target attainment. (p. 110). PSSEP concurs with these findings that clearly show wastewater discharges from POTWs and industrial sources, which make up approximately one percent of the current total load to the Bay, are well controlled and are *de minimus* sources in the overall mercury picture. PSSEP is concerned that, with some of the changes that occurred in the April 2004 Draft as outlined below, these dischargers will not be able to comply with the TMDL - - nor future permits - - and will be forced to make large expenditures that the TMDL is currently trying to avoid, without any significant improvements to the Bay.

#### **Waste Load Allocations (WLA)**

The April 2004 Draft Mercury TMDL contains lower waste load allocation (WLA) for publicly owned treatment works (POTWs) and significant changes in the balance of loads for the industrial wastewater dischargers. The proposed allocations in the April 2004 Draft could have significant, unintended impacts on wastewater dischargers by creating compliance problems not contemplated in the Mercury TMDL and its alternatives and economic analysis. PSSEP believes that the changes made in this last draft will have very little impacts in attaining the mercury sediment targets, but could have significant impacts from the standpoint of NPDES permit compliance. Therefore, the magnitude of the POTW allocation and the pooling of the industrial groups allocation is vitally important.

POTWs: The POTW group WLA has decreased from an allocation of 17 kilograms per year (kg/yr) in the June 2003 Draft to 14 kg/yr in the April 2004 Draft. PSSEP understands that the changes are due to not only to a reevaluation of newer data (2000 to 2003) but also by using a modified statistical approach. This reduction puts the POTW community very close to being out of compliance with the proposed WLA, and could likely be out of compliance due to growth, economic changes, mathematical errors or weather patterns. Indeed, many of the POTWs that already employ advanced treatment of their effluent - - at great historical cost - - will likely be affected most negatively.

PSSEP believes it is imperative that the TMDL explicitly acknowledge the need for future growth and development, and contain a WLA that can accommodate this. This recommendation is consistent with the comment received by peer reviewer, Mr. David Sedlak of UC Berkeley. Although the April 2003 draft hints that future growth may be accommodated through offsets, we point out that offset feasibility has yet to be established.

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In addition, in the response to peer review comments, Regional Board Staff identifies water recycling and plant optimization as the types of improvements that will be required to accommodate growth. These are the same types of improvements that were identified in the Mercury TMDL alternatives analysis for lower WLA or a more expedited attainment and were not chosen because, “[t]o the extent that lower allocations are actually feasible, this alternative could be unreasonably costly for limited environmental benefit. For example, reducing wastewater discharges could cost from \$87 million to almost \$1 billion (LWA 2002) and fail to detectably accelerate target attainment.” (p. 100.) In addition, most wastewater facilities are already implementing mercury pollution prevention programs that have reduced mercury discharges and availability. It is unknown – if not unlikely – that further source control efforts can create additional room to accommodate growth under the proposed allocation.

***PSSEP Recommendation: PSSEP supports a long-term average WLA of 16 kg/yr to the POTW community to allow for an approximate growth increment of 20-25 years.***

*Industrial Wastewater Dischargers:* The April 2004 Draft has made significant changes in the way the WLAs are handled for industrial wastewater dischargers. In the June 2003 Draft, industrial wastewater dischargers were given a WLA of 2 kg/yr as a group. In the April 2004 Draft, refineries are allocated 1 kg/yr as a group and the individual sum of the non-refinery industrial WLA adds up to 1 kg/yr. Another significant change in the industrial wastewater WLA is that the individual WLA have significantly changed. The April 2004 Draft states that the individual allocations were selected after considering each facility’s fractional mercury load and effluent volume for the period 2000 through 2003.

PSSEP is concerned that measuring individual allocations in this sector could stifle economic growth, limiting the opportunities for businesses to change and grow. In addition, many of the allocations in this sector are based on very limited data. Because these WLA will be contained in both the individual NPDES permits and the Basin Plan, it will be harder to respond to market forces than if compliance was measured as a group. As a group, this sector could adjust individual loading without the additional regulatory constraints of antibacksliding concerns and basin plan amendments. Low production years due to the recent economic conditions and plant down times used to determine the individual WLA could cause future compliance problems when the economy rebounds and the plants are operating at full capacity. Measuring the compliance of the industrial wastewater community as a group, rather than individuals or a class of dischargers, will provide some additional flexibility to respond to economic conditions, without requiring Basin Planning or NPDES permitting changes.

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***PSSEP Recommendation: Compliance with the WLA for all industrial wastewater dischargers should be measured as a group with a group allocation of 2 kg/yr.***

#### **Annual v. Five-Year Average Compliance Determination**

The April 2004 Draft TMDL proposes measuring compliance with the WLAs for point source discharges on an annual compared to the a five-year average basis that was contained in the June 2003 Draft. PSSEP supports a five-year averaging period for a number of reasons.

First and foremost, a five-year averaging period for point source discharges allows for flow variations due to weather and the economic driven fluctuations in plant flows. The April 2004 Draft recognizes that rainfall causes substantial inter-annual variability and recognizes that multi-year evaluation is needed to smooth out the high and low rainfall years and that this inter-annual variability effects wastewater discharges. (p. 63). Yet, for some reason, the April Draft ignores this reality and removes the five year averaging period for wastewater dischargers, without adequate explanation. An annual averaging period will likely cause wastewater dischargers to be out of compliance portions of the time, especially during wetter seasons, because the basis for the WLA was a long-term average.

Second, long-term averages are consistent with the major premise of the Mercury TMDL, in that it will take time to meet the mercury targets in the Bay. The Mercury TMDL states that the overall time frame for recovery is 120 years, with the initial load reduction goals occurring within 20 years. (p. 60). The Mercury TMDL provides a five-year averaging period for other sources such as Central Valley Watershed, the Guadalupe River and Stormwater. PSSEP believes these long-term averaging periods are not only appropriate but essential for a fair and equitable TMDL implementation plan. They are also appropriate for the *de minimus* source of wastewater discharges and will have very little, if any impact on the Bay. For example, if one year due to wet weather conditions, the mercury discharge by both wastewater discharger groups is 20% above the WLAs, the overall change to the Bay will only equate to a 0.3% increase based on current loads and a 0.5% increase if all allocations were met.

Finally, the April Draft contains appropriate protections for short-term exceedances. Wastewater dischargers have agreed to study the short-term local effects of their discharges through local bioavailability studies. Concentration triggers will also be implemented in the NPDES permits and Basin Plan. Both these actions both serve to protect the Bay and better understand the fate of mercury near and from wastewater discharges.

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***PSSEP Recommendation: Compliance with the WLA for all wastewater dischargers should be on a five-year average basis.***

**Watershed Permits, Individual WLAs, and Concentration Triggers:**

POTWs: The Regional Board proposes to issue a watershed NPDES permit for all municipal wastewater dischargers. If the group exceeds an annual allocation, the Regional Board will consider enforcement against those who exceed their individual WLA. The approach to individual WLA for POTWs has changed significantly between the June 2003 Draft and the April 2004 Draft. The April 2004 Draft calculates individual allocations based on the fraction of the mercury that plant dischargers compared with other POTWs. The June 2003 Draft calculated the individual WLA based on percentage of flow. Both of these methods do not result in fair individual allocations, and must be revised.

In the April 2004 Draft, POTWs with advanced treatment and aggressive source control programs are penalized due to their low effluent concentrations of mercury. In the June 2003 Draft, treatment plants with only secondary treatment capability would have a hard time meeting the individual allocation, forcing expensive improvements to meet the individual WLA if the group WLA was exceeded.

Determining a fair, equitable, and rational approach for individual WLA is extremely difficult since many factors, such as unused permitted capacity, future growth projections, wet weather or economy-based impacts on flows, recycled water use and potential for recycled water use all differ from POTW to POTW.

PSSEP is also concerned that individual mass allocations will be implemented directly into NPDES permits at some time in the future, especially given that instruction not to include the individual WLAs in individual NPDES permits is never clearly stated in the proposed Basin Plan Amendment. The proposed Basin Plan language on page A-11 (second bullet) requires the permit contain water quality based effluent limits (WQBEL) consistent with the assumptions and requirements of the WLA. This language may be interpreted that individual mass limits and concentration limits, rather than triggers, should be included in NPDES permit as WQBELs. PSSEP recommends that this language be changed to clearly state that the WQBEL is the group WLA. Individual WQBELs for dischargers would be the concentration calculated for the different types of treatment.

PSSEP believes that the individual WLA are unnecessary and should be removed from the TMDL and the proposed Basin Plan Amendment. Unless removed, POTW dischargers will be subject to a watershed permit with a group WLA and concentration trigger appropriate for the level of treatment available. PSSEP does not believe that individual WLA add a necessary level of protection. We support additional evaluation

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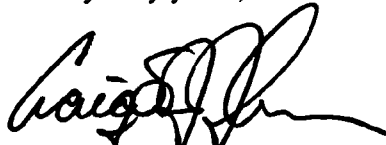
requirements for individual POTWs if the group WLA is exceeded and the individual's concentration limit is exceeded. The process is not enhanced by individual WLA that were determined by a random approach that does not consider the individual POTW. Concentration triggers serve to protect against local adverse effects in the vicinity of the discharge.

***Industrial Dischargers:*** The April 2004 Draft proposes to include a group WLA into the permits of refinery dischargers and individual WLA in the permits of other industrial dischargers. As mentioned in our comments on WLAs, PPSEP believes that compliance for industrial dischargers should be measured as a collective group. We believe this could also be achieved through a watershed permit. For similar reasons as just outlined for POTWs, and due to the limited data from some dischargers, PSSEP also advocates that individual WLA for industrial wastewater dischargers be deleted and concentration triggers be used to determine further action when the group mass load is exceeded.

***PSSEP Recommendation:*** (1) the tables depicting individual WLA should be deleted from both the Mercury TMDL and the proposed Basin Plan amendment. (2) Concentration triggers should be the controlling factor to require additional evaluation and possible pollution prevention or other activities when the group WLA is exceeded. (3) Bullet 2 on pages A-11 and A-12 should be replaced with a statement that permit should contain the group WLA mass limit.

Thank you for the opportunity to provide these comments on the April 2004 Draft Mercury TMDL. We look forward to working with you and your staff in resolving these issues before final consideration by the Regional Board.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Craig S.J. Johns', with a stylized, flowing script.

Craig S.J. Johns  
Executive Director



June 14, 2004  
Bruce Wolfe, Executive Officer  
San Francisco Bay Regional Water Quality Control Board  
1515 Clay Street, 14<sup>th</sup> Floor  
Oakland, CA 94612

Subject: Comments on the "Mercury in Bay", Total Maximum Daily Load Proposed Basin Plan Amendment and Staff Report, April 30, 2004.

Dear Dr. Wolfe:

This letter constitutes the Port of Oakland's comments on the proposed TMDL program. While we will provide a number of detailed comments on aspects of the program, I would like to start by praising the efforts of your staff. Overall, the proposed Basin Plan Amendment and staff analysis is rigorous and balanced. The staff work exhibits, in most parts, a good understanding of the statistical limitations of the available data, and proposes continuing monitoring and/or research to narrow the bounds of uncertainty. To improve the rigor of the effort, the staff has used the university community to provide for peer review of the proposal. Given the magnitude of the problems posed by the legacy of mercury and gold mining in the tributary watersheds of San Francisco Bay, and the substantial data gaps in information about mercury loads, your staff has come up with a credible and responsible program. We will urge in these comments that you provide in the program incentives for creative actions that might better sequester legacy mercury contaminants, and that you integrate this effort with regulatory policies in your implementation of the California Toxics Rule, and in the Long Term Management Strategy to achieve the purpose of this TMDL program.

#### WASTELOAD ALLOCATION TO DREDGERS

The staff report accurately portrays the role of dredging as moving contaminants that are already in the Bay to another location, where they **might** be more available. It also identifies the likely scenario that the LTMS policies will result in material being removed from the Bay and thus that dredging will represent a net loss. Two aspects of the general proposal concern us. First, the concept of an allocation based on the ambient in-Bay concentration, while appearing reasonable, may be fraught with serious statistical problems in implementation. The statistical limitations of existing data, and possible approaches to implementing this concept, might result in material that is well within the scatter of data about ambient sediment quality being rejected for in-Bay disposal. We have begun a dialogue with your staff, and will continue our efforts to try to see this term defined efficiently and accurately.

The second concern we have about the concepts in the report involving regulation of dredging comes from the language at the bottom of page 78 and continuing on to page 79 that provides:

...we propose requirements in the dredging permits to investigate the potential for dredging to enhance mercury uptake. The requirement can be satisfied by supporting or conducting investigations that result in this information being made available to the Water Board beginning with the first adaptive implementation review.

While we recognize the authority of the Regional Board to mandate monitoring, that authority is qualified by the “reasonableness” test. Since dredgers do not create the in-Bay contaminants that they must dredge to maintain navigable channels, it is only reasonable to ask that the dredgers investigate whether or not dredging and subsequent disposal could increase the potential for uptake of mercury from dredging and in-Bay disposal. The Port of Oakland’s recent dredging record involves disposal of the vast majority of dredged material from deepening and maintaining the Federal Navigational channel outside of the Bay, where it removes mercury from the system. We also participate financially in the Regional Monitoring Program at a rate far above any estimates of our relative contribution as a discharger, thus, we think that we have already satisfied the proposals of the TMDL program.

#### ASSUMPTIONS AND ADAPTIVE IMPLEMENTATION

We are particularly impressed with the Board staff’s approach to data limitations in developing this TMDL. The approach that begins on page 86 under “Management Questions” is clear, well organized, and identifies the key assumptions that the staff has made to develop the TMDL and the necessary steps to refine those assumptions. In particular, we endorse your approach to investigation of the uptake of mercury, and your clear intent to try to ascertain whether there are differences in the potential for biological uptake in the various forms that mercury may take. The report identifies (page 59) the assumption that mercury, whether “inorganic, elemental, chemically bound, or not bound” is equally likely to be converted to methylmercury and thus likely to enter the food chain. To these distinctions, we would urge you also consider grain size and mineral province, which might provide physical as well as chemical barriers to uptake. With these additions, we endorse the further investigation of this uptake pathway proposed.

We urge you to establish a greater specificity in your work program for adaptive implementation, particularly with respect to the assumptions made about the active sediment layer, and the potential for erosion and subsequent uptake of mercury enriched sediments. The uniform assumption about the active sediment layer that is made in the TMDL effort derives from assumptions made by SFEI in developing the box model for sediment, that is, that the active sediment layer in the Bay is 15 centimeters. As we have commented on multiple occasions, this assumption, while a reasonable starting point, does not reflect the physics of the Bay. We would like to see the plan of investigation of

the active layer made more specific, since the erosion and re-suspension of sediments is one of the assumptions most critical to loading estimates. We think that investigations in adaptive implementation should, as a high priority work item, identify the areas of highest shear stress in the Bay. We believe that there are two candidates, and a better understanding of the physics of sediment erosion and re-suspension in these areas is critical to adaptive implementation. The highest priority area should be the deposits in Suisun Bay because they contain a mass of bedded mercury with the highest concentration in benthic sediments. Erosion of those sediments from their location upstream of habitat in San Pablo Bay could lead to subsequent deposition in mudflats or wetlands where those sediments could increase methylation rates. The critical shear stress that will affect erosion in that area of Suisun Bay is associated with flood velocity. There should be information available from flood modeling of the river, the ongoing USGS stations, and the recent work by Lester McKee of SFEI that would allow reasonable estimates of velocity profiles during erosive events. That information can and should be used to refine estimates of inputs. The second highest priority area should be San Pablo Bay because the bedded sediments there are also substantially enriched, and because the wave fetch for seasonal wind waves is sufficient to generate substantial waves and associated bottom shear stress. That shear stress can be readily measured, or hind cast from wind data. Information about shear stress rather than assumptions about the active layer should be used to refine our understanding both of the active sediment layer in this region of the Bay, and of erosion potential.

A review of the morphological changes in San Pablo Bay since initiation of gold mining will illustrate this issue. By 1902, a navigational channel had been dredged across Pinole Shoal, but had disappeared in response to currents and the outflow from the Delta. By 1919, a new navigational channel had been dredged and a sheet pile breakwater had been partially constructed. The breakwater can now be seen as a massive structure that prevents shoaling of sediments eroded by wind waves into the Carquinez Strait. That breakwater has trapped nearly 100 million cubic yards of sediment in a broad expanse of tidal marshes and mudflats. That marsh system was not present when hydraulic mining began, and is clearly the product of material reworked from the shoals in San Pablo Bay and brought to the shoreline, where it is anchored by the breakwater.

Examination of the accreted marshes and mudflats along the perimeter of San Pablo Bay, and of recent wetland restoration efforts near the mouth of Petaluma Creek can provide valuable clues to the morphological forces that have shaped the system, and the fate of the mercury present in the system. Core samples can reveal both the types of sediment that have been moved and deposited, and the sequestering of mercury within the accreted areas. Methylation rates at the historically created marsh, and the recently restored marshes, can be compared for valuable clues in the stages of mercury cycling over the maturation of a restored marsh. Mercury levels can be measured from egg shell studies to determine the pattern of uptake in the Clapper Rail. In effect, we have the pilot projects in place to examine and determine what lessons we need to draw upon as we approach wetland restoration planning for both the North and South Bays.

We recommend that you use this testing of the existing marshes in the North Bay to develop the aspects of the adaptive implementation program referred to on pages 85 and 90 (the relationship between mercury concentrations in sediment and in the food web), and before defining further the regulatory measures alluded in the bullet at the bottom of page 62.

#### AREAL VARIATION OF MERCURY ENRICHMENT AND LOADING FROM EROSION

We have been involved in discussions with staff about their estimates of the loading from erosion, and the current version of the TMDL report provides a clear analytical framework for the estimates of loads associated with erosion. Again, this represents a reasonable starting point. However, it is impossible to account for all of the mass of mercury that might have been discharged into the Bay as a result of mining and rendering gold ore. One estimate of the mass of mercury associated with mining; Davis (citing R. K. Churchill in a 1999 talk (2003)) was that 2.4 to 4.8 million kg of mercury were released with the hydraulic mining debris. Better estimates about total sediment loads are available through Bruce Jaffe's work on bathymetric changes in San Pablo and Suisun Bays. That mapping effort shows that roughly half of the estimated sediment load of mining can be accounted for in deposits in San Pablo and Suisun Bays. Yet the volume of mercury subject to continued erosion in the staff report, 50,000 kg, differs substantially from any estimates that might be derived from Churchill's work. While we are not recommending any change in the staff report, we are urging that specific work be targeted to provide a better estimate of the mass of mercury that might be subject to erosion.

#### CREATE FLEXIBILITY IN IMPLEMENTATION

At present, the staff report calls for a reduction in loads from urban water runoff of 78 kg/year, nearly a 50% reduction. It is not clear whether this would be accomplished by physical measures, best management practices, or by waiting until the watershed supplies of enriched mercury are washed through the system. While it is not our intent to comment on the regulation of urban runoff, we would urge that the Board consider a flexible policy framework that would allow load reductions through innovative measures. For example, it might be substantially cheaper for urban runoff dischargers to sequester mercury sediments that are already in the system—perhaps by removing near shore deposits in some area, or capping sediments in another area, or removing sediments from an eroding stream.

To suggest one hypothetical example of such a concept, consider sediments located in Suisun Bay that might be subject to erosion. If such sediments were equivalent to a load reduction of 78 kg/yr, and could be sequestered in a site like the Montezuma wetlands site for lower costs than removing sediments from storm drains, both the Bay and the dischargers would benefit. Removing sediments before they enter San Pablo Bay would provide superior benefits to wetlands fringing the margin of the Bay. This option should also reduce the residence time of mercury in the system as compared to mercury in the

Central Bay since mercury at the northern end of the Bay is much further from the exit path through the Golden Gate.

## INTEGRATE THE TMDL EFFORT WITH OTHER WATER QUALITY PROGRAMS

In order to implement the TMDL, it may be necessary to recognize that program in some of your other efforts, and modify some of the policy framework. We will provide several examples of how this might be done.


- a. Integrate with restoration goals of the LTMS. Currently, the LTMS calls for reuse of 40% of the sediment generated through dredging by reuse in wetlands. Management of mercury methylation in wetlands might dictate certain approaches in wetland design or in the timing of wetland restoration that might require adjustment of this goal, at least during the initial stages of adaptive implementation. Certainly, as a dredger, we would be unwilling to absorb the entire responsibility for analyzing and managing mercury uptake in a multi-user dredged material reuse site. Further thinking is needed to make sure that the LTMS policies are not rendered moot by the mercury TMDL, and that we continue to pursue wetland reuse of dredged material in an environmentally responsible manner.
- b. Consider using wetland restoration sites to sequester mercury sediments and reduce risk. As mentioned above, the Montezuma wetlands restoration site could be used to remove sediments from areas of Suisun Bay where they would be expected to erode in a major flood. This option might be a way to reduce the cost of restoring those wetlands, as well as a way to reduce the environmental risk of the sediments as they are currently present in the environment. Making that option environmentally and economically feasible might require amendments to the Wolfenden Carlin criteria, and possibly to the implementation tools for the California Toxics Rule. These will be discussed in sequence.
- c. Consider modifying the wetland non-cover criteria for mercury and PCB's. When the Wolfenden-Carlin guidelines were prepared, they were intended to represent a conservative approach to ensuring that wetlands could be restored using dredged material with minimal risk. The criteria did not consider either the nature of wetlands that were formed through reworking of fluvial sediments, or the risk that fluvial sediments posed to re-contaminate restored wetlands. We can see the results in the regulatory standards for the Montezuma project—the wetland non-cover limits for that project are substantially lower than the background mercury levels in Suisun Marsh. The elevated mercury levels within the Suisun Marsh are strong evidence that this system was affected by transport of sediments from the gold mining era. Given the very high cost that we are paying to use the site, and the lack of other dredgers who are committed to use the site, the regulatory effort seems to be overzealous. It seems to us counterproductive to set criteria for restoration at this site as low as they have been set—these criteria may prevent completion of restoration of the site economically, and may also

prevent utilization of the site for reducing mercury risk. It seems more appropriate to us to integrate wetland and chemical restoration in a manner that reduces ecological risk.

d. Consider modifying the CTR provisions to allow higher concentrations as part of either sediment clean-up or habitat restoration. The Port of Oakland has had experience with taking "chemically challenged" material to an upland site at Galbraith Golf Course in order to cap a landfill. That effort removed well over 99.99% of the sediments of concern from the Bay. Testing of the material after placement showed that it was nearly the same chemically as that material placed at Sonoma Baylands, suggesting that either the testing protocol was extremely conservative and average levels were below those in the test samples, or that organics were broken down somewhat in the upland placement. While we generally met discharge requirements under the previous Basin Plan, it is unlikely that we could have met the requirements of the CTR. We would suggest that the CTR be implemented in a manner that allows the Board to consider clean-up of sediment hot spots at the Bay margins, or habitat restoration, without meeting those requirements or using an outfall to dilute the discharge. In those cases, the loss of a tiny fraction of the material would not diminish the project accomplishments. On the other hand, controlling the rate of runoff from sediment placed in either a wetland restoration project or a sediment clean-up project, could seriously undermine the feasibility of the project, or increase the cost of sediment remediation without commensurate benefit.

e. Consider the habitat value of contaminated sites at the Bay Margin. While the report mentions the possibility of remediating sediment in sites with elevated mercury levels at the margins of the Bay, the analytical framework for this concept is quite complicated because some of those sites have substantial habitat value despite elevated levels of contamination. I have already mentioned Suisun Marsh, but central Bay sites like Castro Cove and San Leandro Bay are similar in supporting substantial habitat values even though contaminated. It may well be that the levels of contamination in these systems are high enough to represent a substantial ecological risk; perhaps from elevated mercury levels in the endangered Clapper Rail. In that case, the loss of habitat during remediation may well be warranted. However, each of these cases deserves careful scrutiny.

Very truly yours,



Jim McGrath  
Environmental Manager



## WaterKeepers

June 14, 2004

Via Electronic Mail

Bill Johnson, Environmental Scientist  
Richard Looker, Environmental Scientist  
San Francisco Regional Water Quality Control Board  
1515 Clay St., Suite 1400  
Oakland, CA 94612  
BJJ@rb2.swrcb.ca.gov  
REL@rb2.swrcb.ca.gov

**Re: April 30, 2004 Proposed Basin Plan Amendment on Mercury TMDL for San Francisco Bay**

Dear Mr. Johnson and Mr. Looker:

I am writing today on behalf of San Francisco Baykeeper, a project of Waterkeepers Northern California, and its members ("Baykeeper"), to offer the following comments on the proposed Basin Plan amendment for the Mercury TMDL in San Francisco Bay ("Basin Plan Amendment"). Baykeeper appreciates the time and energy that the San Francisco Bay Regional Water Board ("Board") has spent developing a TMDL for the serious mercury problem in San Francisco Bay. The TMDL process offers the Board a unique opportunity to meaningfully reduce mercury loads into the Bay and to make lasting improvements to the health of the region.

Unfortunately, the Basin Plan Amendment, as currently proposed, squanders this unique opportunity through an implementation plan that aims to attain water quality standards after 120 years. Through a number of other flaws, the Basin Plan Amendment also violates the Clean Water Act ("CWA"), California's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California ("SIP"), and the California Environmental Quality Act ("CEQA"). Baykeeper strongly urges the Board to address the failures underlying the Basin Plan Amendment identified herein and to take significant steps to immediately reduce mercury levels in the Bay.

### **I. GENERAL COMMENTS**

#### **A. Mercury Is Impairing The Bay And The Board Should Use This Opportunity To Protect At-Risk Communities and Beneficial Uses**

It is widely documented that the Bay is impaired by mercury, and in fact, has no assimilative capacity for additional mercury discharges. The whole purpose of the

TMDL process is thus to limit discharges of mercury into the Bay in order to move towards meeting water quality standards. The one-box model used to present mercury loads and waste load allocations under this TMDL seems to credit natural attenuation due to export of historically enriched sediment as a reduced load allocation for “bed erosion.” This model on which the Basin Plan Amendment is based seems insufficient and is confusing. While it is true that we can expect a decrease in the total mass of mercury in the Bay due to natural outflow of enriched sediment, the rate of future attenuation is more uncertain than the presentation suggests. Additionally, the model assumes that the enriched sediment will be gradually replaced by “cleaner” sediment, but given the Basin Plan Amendment’s failure to meaningfully decrease mercury loadings into the Bay from, for example, air sources, and wastewater dischargers, the real-world situation is unlikely to be as clean as the model implies.

Furthermore, even if sediment concentrations of mercury are reduced through natural attenuation as suggested by the model, it has been widely documented that total mercury in sediment correlates poorly with mercury in fish tissue. Thus Board Staff’s attempt to impose a linear relationship between mercury in sediment and mercury in fish may not be supported by the evidence.<sup>1</sup> In general, Board Staff understates the uncertainties regarding whether reductions in mass mercury in the Bay – even if achieved – will actually reduce fish tissue concentration of mercury.

This uncertainty is unnerving and seems irresponsible on the part of Board Staff because exposure to mercury has been frequently linked to adverse reproductive and developmental health effects in fish, bird and other wildlife species.<sup>2</sup> When humans consume enough mercury-contaminated fish, they may suffer from severe health effects including headaches, impaired fine motor skills, a weakened immune system, kidney failure, deafness, blindness, mental retardation and death. Fetuses are highly at risk when their mothers consume mercury-tainted fish; they may suffer from various health problems including delayed onset of walking and talking, altered muscle tone, mental retardation, cerebral palsy, deafness and blindness. Some of these health effects have already been documented in wealthy Marin County residents.<sup>3</sup> To date no studies have been done on subsistence fishing communities that actually eat fish out of San Francisco Bay. Studies of these populations are imperative and should be undertaken or assigned by a TMDL process that must assess the environmental impacts of Bay mercury on human health.

According to studies by the Environmental Working Group and Natural Resources Defense Council, impacted community members who fish from piers in San Francisco Bay regularly catch halibut, white croaker, walleye, certain sharks and

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<sup>1</sup> See e.g., USGS 2003 “A National Pilot Study of Mercury Contamination of Aquatic Ecosystems along Multiple Gradients” at 14. [www.cerc.cr.usgs.gov/pub/center/pdfDocs/BSR2001-0009.pdf](http://www.cerc.cr.usgs.gov/pub/center/pdfDocs/BSR2001-0009.pdf).

<sup>2</sup> Barnhart et al., Mercury: Global Problems, Local Solutions, Columbia University, April 2004.

<sup>3</sup> Hightower JM, Moore D., Mercury levels in high-end consumers of fish. *Environ Health Perspect.* 111(4):604-8, 2003.

rockfish<sup>4</sup> all of which are known to have levels of mercury dangerous for pregnant women, breast-fed infants, and young children.<sup>5</sup> Studies have found that the majority of Bay anglers, up to 70%, are people of color including Asians and Latinos.<sup>6</sup> A significant portion of these anglers, up to 42%, had not heard of government health warnings about eating Bay fish.<sup>7</sup>

The Basin Plan Amendment should take immediate actions to warn these consumers, especially the non-English speakers, of the threat to their health and their children's health that these mercury-laden fish pose. Not only does the Board have a responsibility to notify these communities of the threats related to subsistence fishing, but Board Staff should also come up with alternate solutions for those who cannot afford to obtain their protein in other ways, at least until mercury levels in Bay fish diminish. Additionally, it is necessary for the Board to educate these communities about the signs of mercury poisoning and to make sure everyone, including the physicians generally responsible for treating subsistence fishing communities, know the symptoms of mercury poisoning.

Mercury pollution in the Bay is adversely impacting not only human health and wildlife habitat, but also the San Francisco commercial and sportfishing industries, which results in direct impacts to the local economy. Ten million pounds of fish worth \$8.2 million were landed at the San Francisco port in 2003; and although striped bass, halibut and other fish are found in San Francisco Bay, no fish from the Bay can be sold at retail markets today.<sup>8</sup> Additionally, recreational fishing is the second most popular activity in the United States and provides nine times the economic benefits of commercial fishing. California is ranked second in the nation in overall economic output from the sportfishing industry, with estimates of total economic output for 2001 between \$2-5 billion.<sup>9</sup> (The U.S. Fish & Wildlife Service reports that anglers in California spent over \$2 billion in 2001; the American Sportfishing Association reports the 2001 total economic output in California from sportfishing as \$5 billion.) However, in recent years, sport fishermen are no longer able to consume their catch due to mercury and PCB contamination and thus they have significantly reduced the number of days they fish, to the detriment of the state economy.<sup>10</sup>

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<sup>4</sup> See [www.nrdc.org](http://www.nrdc.org)

<sup>5</sup> See [www.ewg.org/reports/BrainFood/sidebar.html](http://www.ewg.org/reports/BrainFood/sidebar.html)

<sup>6</sup> See [www.nrdc.org/greengate/health/fishv.asp](http://www.nrdc.org/greengate/health/fishv.asp)

<sup>7</sup> See *id.*

<sup>8</sup> <http://www.nrdc.org/greengate/health/fishv.asp>

<sup>9</sup> <http://www.census.gov/prod/2002pubs/fhw01-ca.pdf>;

[http://www.asafishing.org/asa/images/statistics/economic\\_impact/fish\\_eco\\_impact.pdf](http://www.asafishing.org/asa/images/statistics/economic_impact/fish_eco_impact.pdf)

<sup>10</sup> Clear The Air, [cta.policy.net](http://cta.policy.net)

**B. This TMDL Should Explore Possibilities To Reduce Mercury And To Achieve Water Quality Standards In A More Timely Manner**

While the Basin Plan Amendment correctly states that the “mercury problem in San Francisco Bay may take decades to solve” and that “there are activities that should be taken immediately to help manage the risk to consumers of mercury-contaminated fish,”<sup>11</sup> Baykeeper does not believe that this Basin Plan Amendment represents a good-faith effort to solve the mercury problem or to manage the risk to consumers. Given that the TMDL predicts that Bay fish will continue to have unacceptable levels of mercury for at least 120 years, and that the feasibility of control measures is highly uncertain, risk management should be a major focus of the Basin Plan Amendment and the Board’s future actions with regard to mercury. The Basin Plan Amendment, however, only devotes one paragraph and three bullet points to risk management, all of which refer to activities that are already being implemented.

There are a number of actions that the Board can take right now to reduce mercury contamination in the Bay.

First, Board Staff should include in the Basin Plan Amendment immediate plans to clean up the great number of leaching mine sites that drain into the Bay watershed. In fact, US EPA recommends many techniques to remediate these types of sites. Two of the largest mercury mine sites in the Bay Area watershed are the New Almaden mining district in Santa Clara County and New Idria mine in San Benito County.<sup>12</sup> These mines drain into the San Francisco Bay watershed and are rated by the Office of Mine Reclamation as having the highest potential environmental. Other mines draining into the Bay watershed with potentially significant environmental hazard ratings are in nearby Napa and Marin counties. These sites should be remediated and restored so that these historic mercury sources are no longer contributing to the mercury problem in the Bay.

Other states have successfully adopted strategies to remediate contaminated mine sites. As in the October 15, 1999 TMDL and Implementation Plan for Mercury, Pena Blanca Lake, Arizona, the mercury TMDL for San Francisco Bay should include a plan for aggressive remediation of contaminated mine waste and tailings at the numerous mine sites polluting the watershed.<sup>13</sup> The TMDL should also provide for ongoing monitoring of the mine sites and responses within the Bay, including after the remediation activities are complete. US EPA also describes in detail various conventional and innovative technologies to remediate leaching mine sites. The conventional technologies have a successful track record in mine site cleanup, and include technologies such as chemical treatment, stabilization, solidification, extraction techniques, soil washing or flushing, cutoff walls, capping, detention and sedimentation, erosion controls and diversions.<sup>14</sup>

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<sup>11</sup> Proposed Basin Plan Amendment at A-15.

<sup>12</sup> [www.consrv.ca.gov/OMR/abandoned\\_mine\\_lands/california\\_abandoned\\_mines/volume1.pdf](http://www.consrv.ca.gov/OMR/abandoned_mine_lands/california_abandoned_mines/volume1.pdf)

<sup>13</sup> [www.epa.gov/waters/tmdl/docs/919.pdf](http://www.epa.gov/waters/tmdl/docs/919.pdf)

<sup>14</sup> [www.ott.wrcc.osmre.gov/library/hbmanual/epa530c/chapter10.pdf](http://www.ott.wrcc.osmre.gov/library/hbmanual/epa530c/chapter10.pdf)

Several university studies also suggest innovative techniques to lessen the toxic effects of mercury-laden mine waste, such as treating mine tailings with a carbon source such as whey, or mixing organic matter such as biosolids with inorganic mine waste to make soil that can support vegetation to stabilize the mine tailings and reduced wind erosion.<sup>15</sup>

Second, the alternative management strategy of increasing the loading capacity for mercury in the Bay should also be considered. The Basin Plan Amendment should address innovative new techniques to clean up existing mercury in sediment, or at least slow down the mercury methylation process. This strategy has been adopted successfully by other states with aquatic mercury pollution.<sup>16</sup> Various management intervention methods may decrease rates of bacterial methylmercury production or increase rates of burial and sequestration of mercury in sediment. The applicability of such methods to the San Francisco Bay should be studied. Strategies include aeration and mixing, sulfur chemistry modification, alum treatment, and sediment dredging. Board Staff should not only review these strategies adopted by other states, but should also look at US EPA recommendations for innovative and emerging technologies for remediation of existing sediment contamination, including bioremediation, phytoremediation and vitrification.<sup>17</sup>

Third, Board Staff should use the Basin Plan Amendment process to include specific proposals to be included in adaptive implementation. These must include measures to mitigate and compensate for damage to human health, including means to assist the most affected communities with dietary change and health monitoring. Board Staff should also be using this process to identify measures that might compensate for ecological risk to wildlife, including habitat restoration or other means that can help compensate for the impacts of mercury on reproductive success. In this regard, actions related to “Bay margin contaminated sites” or mercury hot spots, should receive higher priority and more emphasis than is given in the proposed amendment.

While Board Staff proposes to require additional monitoring, reporting, and quantification at some unidentified point in the future, the Basin Plan Amendment contains not one strategy that would actually speed up the pace of investigation and remediation of these sites or create assimilative capacity in the watershed.

### **C. The Proposed Basin Plan Amendment Sends The Wrong Message**

Baykeeper appreciates that the existing mining legacy in California continues to contribute to mercury loadings in the Bay. We also appreciate that under the Basin Plan Amendment some sources of mercury loadings will be somewhat reduced within twenty

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<sup>15</sup> [www.montana.edu/commserv/csnews/nwview.php?article=1617](http://www.montana.edu/commserv/csnews/nwview.php?article=1617);  
<http://cals.arizona.edu/media/archives/6.2.html>

<sup>16</sup> See e.g., TMDL and Implementation Plan for Mercury, Arivaca Lake, AZ, October 15, 1999.  
[www.epa.gov/waters/tmdl/docs/17.pdf](http://www.epa.gov/waters/tmdl/docs/17.pdf)

<sup>17</sup> [www.ott.wrcc.osmre.gov/library/hbmanual/epa530c/chapter10.pdf](http://www.ott.wrcc.osmre.gov/library/hbmanual/epa530c/chapter10.pdf)

years and that attempts are being made under the TMDL to issue individual allocations for wastewater dischargers. But the Basin Plan Amendment remains seriously flawed.

There are many problems with the plan as proposed. First, the Bay has no assimilative capacity for mercury, and until this capacity is available, there cannot be any net loading into waterways that lead to the Bay. Any mercury loading without assimilative capacity violates the CWA and the TMDL program. Second, under the plan, municipal wastewater and industrial waste water dischargers are not required to do anything to reduce their loadings from current levels. And they are still essentially dealt with in the aggregate. The Board's most controllable sources of mercury, therefore, have no reason to reduce a single gram of mercury discharged into the Bay. And third, not only do the dischargers have three different options for "calculating" or manipulating their numbers to show compliance, but exceedences of allocations will trigger only the writing of a report and not monetary fines as required under the Clean Water Act. Requiring dischargers to simply summarize their violations of the limits in different ways with a cover page on top does not create any incentives to reduce inputs into the Bay.

The fatal flaws contained in the Basin Plan Amendment send one clear message to the dischargers: the Board is going to go out of its way to allow business as usual. These same flaws send another message to the public: the Board cares more about keeping dischargers happy than about public health or the health of our aquatic ecosystems. We urge the Board to send a different message; a message with vision, which encourages producers and dischargers of mercury to figure out innovative ways to stop mercury loadings into the Bay, or which creates an incentive for dischargers to clean up the mercury in Bay sediment in order to increase assimilative capacity. Given the serious threat that mercury poses on the environment and public health, Baykeeper believes that this different message is the Board's only true option as the responsible agency for protecting the Bay's waters and communities.

#### **D. TMDLs Are The Clean Water Act's Safety Net**

There is no doubt that Section 303(d) represents the Clean Water Act's "safety net."<sup>18</sup> It is the bedrock component of the CWA by requiring that all waters be restored to levels safe for fishing and swimming, as well as achieving levels to meet all other water quality standards.<sup>19</sup> As a U.S. EPA Assistant Administrator for Water noted:

Almost twenty-five years after the passage of the [Clean Water Act], the national water program is at a defining moment . . . . The [TMDL]

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<sup>18</sup> Houck, Oliver A., *The Clean Water Act TMDL Program* 49 (Envtl. Law Inst. 1999).

<sup>19</sup> See 33 U.S.C. § 1313(d).

program is crucial to success because it brings rigor, accountability, and statutory authority to the process.<sup>20</sup>

TMDLs are “the maximum amount of pollutants a water body can receive daily without violating the state’s water quality standard.”<sup>21</sup> Specifically, Section 303(d) requires the states to identify, and U.S. EPA independently to review and assess, those waters within their boundaries for which existing technology-based pollution controls are not stringent enough to ensure that the water quality standards applicable to such waters are achieved and maintained.<sup>22</sup> For each water body and pollutant listed on a 303(d) list, the state must calculate the Total Maximum Daily Load necessary to implement the applicable water quality standards.<sup>23</sup> In simple terms, then, each TMDL defines the maximum amount of a pollutant (*e.g.*, oil, pesticide, metal) that an individual water body can assimilate in a day without violating its water quality standards (*i.e.*, without becoming “dirty”). Once a TMDL is calculated for a water body and pollutant, any allowable pollution is allocated among the various dischargers of that pollutant to the water body for which the TMDL has been established.<sup>24</sup>

## **II. SPECIFIC CONCERNS REGARDING THE BASIN PLAN AMENDMENT**

### **A. The Implementation Timeframe Is Too Long Because Meaningful Action Can Be Taken Now**

Baykeeper strongly opposes the 120-year implementation schedule that underlies this Basin Plan Amendment. The Clean Water Act does not contemplate such incredibly long implementation schedules, and in fact, unfalteringly requires that effluent limitations and water quality standards be met within three years after adoption.<sup>25</sup> The CWA also articulates a goal of achieving fishable, swimmable, and navigable waters by 1983.<sup>26</sup> Board Staff’s 120-year timeline, therefore, makes a mockery of the spirit and letter of our nation’s Clean Water Act.

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<sup>20</sup> New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs), Memorandum from Robert Perciasepe, Assistant Administrator for Water, U.S. EPA, to Regional Administrators and Regional Water Division Administrators, U.S. EPA (August 8, 1997).

<sup>21</sup> Alaska Center for Environment v. Browner, 20 F.3d 981, 983 (9th Cir. 1994).

<sup>22</sup> 33 U.S.C. § 1313(d)(1) and (2); *see also* 40 C.F.R. § 130.7(b)(1).

<sup>23</sup> 33 U.S.C. § 1313(d)(1)(C).

<sup>24</sup> 40 C.F.R. §§ 130.2(g)-(i). The TMDLs must be set “at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.” 33 U.S.C.A. § 1313(d)(1)(c).

<sup>25</sup> *See* 33 U.S.C. § 1311(b).

<sup>26</sup> *See* 33 U.S.C. § 1251(a).

Similarly, the improperly long timeframe also violates California's water quality regulations. While the SIP does allow for longer implementation schedules for waters regulated by TMDLs, it in no way permits 120 years for compliance. In fact, the SIP states "the schedule of compliance must be as short as practicable" and must "demonstrate progress towards attainment" of water quality standards.<sup>27</sup> There can be no disagreement that the implementation plan proposed through the Basin Plan Amendment is neither short nor able to demonstrate eventual attainment.

This 120-year timeframe for the Bay's recovery from past and ongoing mercury degradation is completely unacceptable because, as seen by the possible solutions above, we are not convinced that the Board Staff and dischargers are doing everything that they can do now to alleviate the mercury problem. While there arguably may not be any fast solution to eliminating the existing mercury in sediment, there certainly are actions that current dischargers of mercury can take to significantly reduce their loads within the short timeframes envisioned by the CWA and the SIP.

Specifically, a twenty-year compliance timeframe for urban stormwater runoff and the Guadalupe River and Central Valley watersheds to simply reduce their loads by half is unjustified. The SIP states that "in no case" shall the schedule of compliance for point source dischargers exceed "up to five years" for compliance with TMDL-derived effluent limitations.<sup>28</sup> If dischargers cannot immediately comply, they must justify any extension of "up to five years"<sup>29</sup> by submitting "documentation of source control and/or pollution minimization efforts currently underway and a proposed schedule for additional source control measures and pollutant minimization actions."<sup>30</sup> It is not apparent that the mercury dischargers here have provided a level of justification enough to warrant even a 5-year schedule, and they have certainly not justified a schedule that only attempts to achieve partial compliance with water quality standards. Furthermore, there is absolutely no justification for allowing municipal and industrial wastewater dischargers off the hook entirely.

Under this schedule, no one alive today will live to experience this theoretical recovery. More importantly, perhaps, the Basin Plan Amendment's attempt to go more than a century without assimilative capacity in the Bay Area watershed but continue mercury input into the Bay exacerbates the mercury pollution problem. This ill-fated attempt also underscores the TMDL's other flaws and renders the whole process unacceptable. It is all too probable, in fact, that the plan proposed through this TMDL process could fail to lead to recovery even after 120 years. Therefore, Baykeeper urges the Board to implement more creative solutions to try to reduce new mercury inputs into the Bay.

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<sup>27</sup> SIP (2000) at 4.

<sup>28</sup> *Id.* at 19-20.

<sup>29</sup> *Id.*

<sup>30</sup> *Id.* at 4.

## **B. Allocations Should Be Zero Until There Is Assimilative Capacity**

A TMDL must be set at a level that will achieve attainment of water quality standards immediately. Certain sources, such as bed erosion, may be difficult to control and may absorb most or all of the waterway's assimilative capacity. In this situation, the logic of TMDLs requires that the other sources share the remainder of the assimilative capacity. If, as is the case here, the sources that are difficult to control take up all of the assimilative capacity, then all of the controllable sources should receive loads of zero until the assimilative capacity becomes available. According to the TMDL's projections, this should be sometime after 120 years.

Section 303(d) of the CWA takes neither economic feasibility nor consequence into account. It requires that states establish a TMDL for those waters that are not meeting water quality standards. "Such load shall be established at a level necessary to implement the applicable water quality standards."<sup>31</sup> No mention is made, however, of considering the economic feasibility of implementing TMDLs. This "whatever it takes" principle may seem unfair to some dischargers, but it is the law. The law simply insists that sufficiently low loads be set to achieve the relevant standard.

Instead of giving allocations of zero or calling for real reductions in loadings, we are concerned that the TMDL's five-year averagings provides an out to dischargers and can be used to rationalize increased mercury loadings. No legally acceptable rationale for allowing such increases exists given the total absence of assimilative capacity in the Bay. Baykeeper will strenuously oppose any increases in permits and requests that the Basin Plan Amendment eliminate the option to use five-year averages in order to make clear that reductions are necessary.

The TMDL's rationale for failing to reduce the loads allocated to wastewater sources seems to be that the contribution from these sources are small relative to bed erosion. The Basin Plan Amendment, however, does not present a single concrete implementation step to deal with bed erosion. Indeed, the implementation plan does not even include a section on bed erosion. Board Staff at the mercury watershed council meeting acknowledged that they do not expect to see reductions in this source for at least 20-30 years. The report makes clear that without reductions in the contribution of bed erosion, assimilative capacity will not be available until well into the next century. Until that time, then, controllable sources such as wastewater and stormwater should be allocated zero loads and in no event should such sources be permitted to increase their individual contributions.

In particular, the Basin Plan Amendment should make clear that effluent limits based on the TMDL cannot replace more stringent water quality-based effluent limits

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<sup>31</sup> 33 U.S.C. § 1313(d)(1)(C).

(“WQBELs”) or performance based limits (“PBELs”) currently in permits. A waste load allocation may replace a WQBEL or PBEL only when it is more stringent. The CWA’s requirements regarding WQBELs and PBELs are separate and distinct from the TMDL requirements.<sup>32</sup> A WQBEL is required where technology-based limits do not succeed in securing attainment of water quality standards.<sup>33</sup>

Since the Bay will not attain water quality standards for mercury until sometime around 2120, NPDES permits allowing mercury discharge must contain WQBELs until then. In theory, the TMDL’s waste load allocations should be more stringent than WQBELs and PBELs since there is no assimilative capacity. If the Basin Plan Amendment is adopted as framed, however, dischargers may seek to evade the effect of low WQBELs and PBELs that have been calculated for NPDES permits by arguing that these limits have been displaced by the TMDL’s categorical loads. At a minimum, then, permits should contain the most stringent of an individual waste load allocation, an existing water-quality based effluent limit, or an existing performance based limit. The waste load allocation process should never result in permit rollbacks, especially while assimilative capacity remains nonexistent.

### **C. Allocations Must Be Made To Individual Sources, Aggregate Allocations Have No Legal Significance**

The Basin Plan Amendment continues the TMDL’s illegal categorical allocations with respect to Central Valley and Guadalupe River dischargers, to municipal and industrial stormwater dischargers, and to urban stormwater runoff. While the Amendment does assign individual allocations to certain dischargers (e.g., urban stormwater), these individual allocations are superficial because only group allocations are required to be achieved within 20 years.<sup>34</sup> Additionally, as in the case of municipal and industrial wastewater dischargers, an exceedence of the individual’s allocation only results in the writing of a report.<sup>35</sup> In reality, this has the same effect as an individual exemption and provides no accountability for individual dischargers or enforceability against particular sources.

The load must instead be “established at a level necessary to implement the applicable water quality standards....”<sup>36</sup> EPA’s implementing regulations require a TMDL to allocate specific loads to individual sources. Specifically, a waste load allocation is “the portion of a receiving water’s loading capacity that is allocated to one of its existing or future point sources of pollution.”<sup>37</sup> Similarly, a load allocation is “the portion of a receiving water’s loading capacity that is attributed...to one of its existing or

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<sup>32</sup> 33 U.S.C. § 1312(a).

<sup>33</sup> 33 U.S.C. § 1311(b)(1)(c), 2(a).

<sup>34</sup> Proposed Basin Plan Amendment at A-8.

<sup>35</sup> *Id.* at A-11.

<sup>36</sup> 33 U.S.C. § 1313(d)(1)(C).

<sup>37</sup> 40 C.F.R. § 130.2(h). (Emphasis added).

future non-point sources.”<sup>38</sup> Therefore, by essentially allocating loads to categories of sources rather than individual sources, the mercury TMDL violates the CWA.

Additionally, categorical waste load allocations cause unnecessary confusion in the derivation of effluent limitations. The CWA requires that effluent limits developed for permits be equal to or less than the waste load allocations developed in the TMDL.<sup>39</sup> The implementing regulations state that “[w]hen developing water quality based effluent limits, the permitting authority shall ensure that...[e]ffluent limits developed to protect a narrative water quality criterion...are consistent with the assumptions and requirements of any available waste load allocations for the discharge prepared by the State and approved by EPA pursuant to 40 C.F.R. § 130.7.”<sup>40</sup> To have any meaning at all, “consistent with” must mean equal to or less than the waste load allocation. The categorical allocations introduce an obscuring element to these consistency determinations, which we hope is unintentional. Baykeeper urges Board Staff to eliminate this unnecessary and confusing component of the TMDL, if only to make the Board’s monitoring and enforcement jobs easier.

Moreover, the categorical approach slows down implementation by removing all incentives for improving individual performance. The Basin Plan Amendment interposes a complicated group compliance mechanism in place of individual accountability. In an individual allocation scheme, reductions of any single discharger’s mercury loadings below their allocation would benefit the Bay. An exceedence of the allocation would subject the discharger to CWA penalties, thereby creating a strong incentive for more creative solutions to achieve future compliance. In a group allocation scenario the benefits of good performers could and likely would be overshadowed by other dischargers who have not changed their loads. The net result would be to prolong ultimate achievement of water quality standards – in violation of the CWA’s direct mandate. Individual accountability is the tried and true mechanism for achieving pollutant reductions. Baykeeper requests that each mercury source be made accountable for its own output as is required by the CWA and by common sense. Clear individual accountability is the only way to ensure rapid recovery for the Bay.

Lack of information cannot and does not justify the categorical approach. In the case of wastewater dischargers, sufficient information clearly exists to carefully divvy up the categorical allocation and issue real load reductions. But for some inexplicable reason, Board Staff has refused to do so. In the other cases, such as municipal stormwater, Central Valley dischargers, and air sources, where existing loads may not be sufficiently understood, the implementation plan should explicitly set forth how this information will be acquired, a deadline for when it will be acquired, the basis for allocating the individual loads once the information is acquired, and a deadline for

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<sup>38</sup> 40 C.F.R. § 130.2(g). (Emphasis added).

<sup>39</sup> 40 C.F.R. § 122.44(d)(4)(vii)(B).

<sup>40</sup> *Id.* and *EPA NPDES Writers’ Manual*, 1996, at 111.

making the allocations.<sup>41</sup> In the meantime these other sources “should be defined as narrowly as available information allows.”<sup>42</sup>

Finally, the Basin Plan Amendment envisions the writing of a report as a penalty for exceedences. This penalty would be laughable if mercury was not such a serious problem in our watershed. The Board must take its own responsibility to implement the CWA seriously and be crystal clear that the penalty for a violation of waste load allocations and permit effluent limits is always a penalty as defined under the CWA.<sup>43</sup>

#### **D. The Board Has An Obligation To Assign Allocations To ALL Sources**

Even though the Basin Plan Amendment acknowledges that “mercury newly deposited from the atmosphere may be more available for biological uptake” than the mercury already present in the ecosystem, Board Staff continues to fail to take meaningful action with regard to air sources.<sup>44</sup> Board Staff claims that this is because “the extent to which these sources can be controlled is unknown and the Board’s authority to control such sources is limited.”<sup>45</sup> Baykeeper strenuously objects to the Basin Plan Amendment’s failure to allocate loads to local air sources and believes the TMDL is incomplete without this inclusion.

The law is clear that the Board must allocate loads to all sources. If it fails to do so, it is in violation of Section 303(d) of the CWA and also in violation of 40 C.F.R. § 130.2(h). Although some air deposition does come from unknown and uncontrollable sources abroad, a substantial portion of aerially deposited mercury comes from local sources, including power plants, oil refineries, chlorine manufacturers, municipal waste incinerators, and concrete, cement and fabricated metal production facilities, which have, or should have, NPDES permits in addition to Clean Air Act discharge permits. The TMDL indicates that between 10% to 59% of the atmospheric mercury in the Bay Area comes from local sources. This statistic suggests a solid opportunity for reducing the air deposition sources. Given the dire state of affairs described in the accompanying TMDL report, Board Staff cannot afford to pass up any chance to reduce mercury from these known sources. The passing off of this responsibility to US EPA and the Bay Area Air Quality Management District for “investigation” without any real directive is meaningless.<sup>46</sup>

At the July 2, 2003 Watershed Council meeting, Baykeeper raised concerns over the lack of regulations of any atmospheric sources, and the alarming fact that no

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<sup>41</sup> See EPA Memorandum Re: Establishing Total Maximum Daily Load Wasteload Allocations for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs, November 22, 2003, at 4.

<sup>42</sup> *Id.*

<sup>43</sup> See 33 U.S.C. § 1319.

<sup>44</sup> Proposed Basin Plan Amendment at A-13.

<sup>45</sup> *Id.*

<sup>46</sup> See *Id.*

reductions were given to these sources. Staff responded that, at this time and in their opinion, insufficient information exists to allocate loads to air sources. This proposition is clearly false. Many of the local sources of atmospheric mercury are known and understood, are regulated by a sister agency under California EPA, and are regularly monitored. For example, Board Staff's April 1, 2003 memo regarding air sources of mercury deposition makes clear that staff has calculated the mass of mercury in crude oil processed by Bay Area refineries to be 382 kg of mercury per year. The only area of uncertainty seems to involve translating a particular air contribution into a mass load for the Bay. This uncertainty does not excuse Board Staff from establishing an allocation that can be adjusted after more information is obtained. To the contrary, in fact, the lack of information suggests that very stringent loads should be allocated to these sources in order to provide the legally required margin of safety until more is known.<sup>47</sup>

In circumstances such as this where assimilative capacity is zero, there is no justification for delay to further "evaluate the significance of atmospheric depositions"<sup>48</sup> because all sources are contributing to the Bay's nonexistent capacity. As such, each and every local, controllable source must be regulated. "Controllable" simply means the source can be controlled through some entity or means, as opposed to an uncontrollable source, such as bed erosion. The TMDL incorrectly uses the word controllable to mean sources that Board Staff does not currently know how to control or that are not known to be cost-effective to control. Baykeeper objects to this use of the term for air sources. All the available evidence suggests that local air sources are a significant contributor of mercury to the Bay. All the evidence also suggests that reductions in local air sources would benefit the Bay and increase the speed of recovery. The TMDL report even contains some discussion of the cement industry but dismisses loads by suggesting that some technologies may not be "cost effective" for the industry. The CWA, however, does not permit Board Staff to delay achievement of water quality standards under a TMDL on the grounds of costs or other economic factors.<sup>49</sup> Consequently, loads should be allocated to sources such as cement manufacturers despite the costs that will be imposed. Baykeeper is certain that once a meaningful load is allocated to these sources with costly consequences for failing to meet this load, they will use the new market niche to quickly and creatively find cost-effective technologies to meet the allocation.

The Basin Plan Amendment also suggests that local air sources are not meaningfully included as part of the TMDL because the Board's "authority to control such sources is limited."<sup>50</sup> Baykeeper is unaware of any legal basis for this limitation on the Board's authority. To the contrary, the Board's position as the entity delegated authority to issue CWA permits suggests otherwise. The CWA and its implementing regulation impose a clear and unambiguous obligation on California to allocate loads to

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<sup>47</sup> 33 U.S.C. § 1313(d)(1)(C).

<sup>48</sup> Proposed Basin Plan Amendment at A-13.

<sup>49</sup> 33 U.S.C. § 1313(d)(1)(C).

<sup>50</sup> Proposed Basin Plan Amendment at A-13.

all sources.<sup>51</sup> As the state agency responsible for implementing California's mercury TMDL in the Bay, the Board derives its authority directly from Section 303(d) of the CWA. Any state law to the contrary is preempted by the federal statute. If the Board believes it lacks the authority to carry out a legally sufficient TMDL, it should relinquish the TMDL to another state agency that has the power and will to fulfill the CWA's mandates.

If Board Staff continues to insist that knowledge of air mercury sources is still inadequate at this time or that it does not have authority to regulate air sources, it would then be appropriate, and in line with the law, for the Board to include an unallocated reserve and allocate only a portion of the estimated TMDL to known sources. This strategy has been successfully adopted in other states. The 1999 TMDL and Implementation Plan for Mercury, Pena Blanca Lake, Arizona, for example provides for a 45% unallocated reserve to account for aerial deposition.<sup>52</sup> Baykeeper would support this reserve allocation as a temporary solution until more information is gained regarding air sources.

#### **E. The Basin Plan Amendment Must Make Enforceable Allocations To Other Watersheds**

The Basin Plan Amendment continues to inadequately address Central Valley sources. The production and use of fertilizers and biosolids, among other Central Valley sources such as stormwater, wastewater, and air sources, are known to contribute to the large amounts of mercury and methyl mercury in the Bay-Delta watershed. Until allocations to these individual sources in the Central Valley are complete, the Mercury TMDL for the Bay remains incomplete as both a legal and practical matter. The real possibility remains that the future regulatory process in the Central Valley will come to a different total load than 330 kg per year provided for under this process. If this happens, the TMDL equation and allocations for mercury in the Bay will be ruined. If the Central Valley Water Board Staff establishes a dramatically higher TMDL for the Delta then all other loads in the Bay will require adjustment. Consequently, Baykeeper does not support amendments to the Bay's Basin Plan until this critical question is settled. The Central Valley Basin Plan must be amended at the same time as the Bay's plan to assure a consistent and complete TMDL for the Bay.

As an alternative, Baykeeper would support this Board's allocation of loads outside this region. Board Staff believes that the Board does not have jurisdiction to regulate or assign individual loads in this manner. Baykeeper believes the usual jurisdictional limitations on the Board are trumped for TMDL processes, where all sources must receive allocations, by federal preemption under the CWA. Moreover, even if Board Staff continues to insist that its jurisdiction is limited, it can do more to advance

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<sup>51</sup> 33 U.S.C. § 1313(d)(1)(C), 40 C.F.R. §130.2(g) and (h).

<sup>52</sup> [www.epa.gov/waters/tmdl/docs/919.pdf](http://www.epa.gov/waters/tmdl/docs/919.pdf)

the solutions to the problem. The Board can petition the State Board to accelerate development of the Central Valley component of the mercury TMDL, and begin the analyses necessary to complete that portion of the TMDL in order to give the Central Valley an incentive to begin the long process.

With regard to the Guadalupe River TMDL, there is no dispute that this Board has full jurisdiction over that process. Although the Board has established a separate administrative process to deal with the Guadalupe River mercury problems, the Guadalupe River is part of the Bay's watershed and load allocations in the whole watershed are a legally required part of this Basin Plan Amendment. Therefore, without allocations to all those sources, the Bay TMDL is legally incomplete. Baykeeper cannot support Basin Plan amendments that are incomplete and illegal. This amendment must be done contemporaneously and consistently with the amendments implementing the portion of the mercury TMDL in the Guadalupe River.

**F. The Methods For Demonstrating Compliance With Allocations Are Illegal, Especially Since TMDLs Require "Daily" Loads**

The Basin Plan Amendment proposes to allow the entire Central Valley watershed, all urban stormwater dischargers, and all Guadalupe River dischargers to determine compliance with their allocations and/or aggregate loads once every five years by comparing the average load over five years to the allocation.<sup>53</sup> This approach is illegal. Section 303(d)(1)(C) requires calculation and allocation of "daily" loads. The Basin Plan Amendment's use of five-year averages to determine compliance reads the word "daily" right out of Section 303(d). There is no justification for this approach and, in fact, there is no analysis of whether the five-year average is even statistically sufficient to identify mercury discharge trends given interannual variations in rainfall, sediment loading, and pollutant loading.

The use of five-year averaging combined with unlawful categorical allocations means that individual wastewater dischargers could substantially increase their loadings over several years and still not be held liable under the Basin Plan Amendment. Such increases are completely illegal. Moreover, they cannot be permitted until assimilative capacity is available. By further decoupling individual performance from accountability, the five-year averaging mechanism will further delay achievement of water quality standards. In light of the already vast timeframe for recovery under this TMDL, this type of delay is wholly unjustified.

The CWA requires waste load allocations to be expressed as daily mass limitations, especially when incorporated into NPDES permits. If Board Staff cannot comply with the letter of the law, we urge them to at least express the waste load allocations with as much resolution as the effluent limitations in current permits. In the

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<sup>53</sup> Proposed Basin Plan Amendment at A-8 through A-10.

case of wastewater permits, this means monthly and daily concentration limits and/or monthly mass limits. Monitoring should occur at least monthly to determine compliance with the waste load allocations. The Basin Plan Amendments contains no defensible rationale for the five-year compliance review option except the apparent desire to go easy on certain dischargers. In fact, it is likely that this five-year averaging strategy may potentially render enforcement of this amendment impossible depending on when the statute of limitations will begin to run on violations. These are the only dischargers that Board Staff has expressed a willingness to regulate, but unfortunately, this scheme will allow even these dischargers off the hook for real reductions in mercury loadings.

The other two methods for dischargers to demonstrate compliance, as provided in the Basin Plan Amendment, are also improper and will allow “fuzzy math” to prevent meaningful load reductions. For instance, selected dischargers are allowed to “quantify the annual average mercury load avoided by implementing pollution prevention, source control, and treatment efforts.”<sup>54</sup> This type of quantification, if possible, is of course permissible, but it is not acceptable for Board Staff to recognize “loads avoided resulting from activities implemented after 2001 as counting toward the load reductions.”<sup>55</sup> The SIP clearly states that “limitations for the pollutant must be based on current treatment facility performance or on existing permit limitations, whichever is more stringent.”<sup>56</sup> Nowhere in the SIP does it state that dischargers can count source control measures implemented two years earlier in order to assess compliance with new limitations. Any such allowance essentially permits backsliding and is a violation of the SIP.

Furthermore, the final method for calculating compliance with allocations is to allow sediment discharges in the Bay that are below “suspended sediment target.”<sup>57</sup> This method of calculating compliance is problematic, however, because as is the case with all of the discharges permitted by this Basin Plan Amendment, these discharges of sediment will purportedly still allow discharge of mercury-laden sediment into a Bay without assimilative capacity. Any permissible discharge must take into account the cumulative impacts of mercury, especially since we are dealing with a bio-accumulative toxin. These three faulty methods are not protective enough to accurately reflect and encourage reductions in loadings, especially since the amendment is asking dischargers to calculate compliance with already weak allocations.

#### **G. The Basin Plan Amendment Fails To Implement An Adequate Margin Of Safety**

Pursuant to Section 303(d) of the CWA, TMDLs must be established at “levels necessary to meet applicable water quality standards, accounting for seasonal variations

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<sup>54</sup> See e.g., *id.* at A-10.

<sup>55</sup> *Id.*

<sup>56</sup> SIP at 20.

<sup>57</sup> See e.g., Proposed Basin Plan Amendment at A-10.

and with a margin of safety to reflect lack of certainty about discharges and water quality.”<sup>58</sup> A margin of safety is supposed to ensure that the TMDL is protective of water quality in the face of uncertainties in the available data.<sup>59</sup> This Basin Plan Amendment, therefore, should be set at a level that will achieve attainment of water quality standards and should include an adequate margin of safety. While the Basin Plan Amendment and associated TMDL documents claim to include a margin of safety, Baykeeper does not believe that the true function of this requirement has been met here.

For instance, it is unclear why the Basin Plan Amendment only applies a 50% reduction to loads for urban stormwater runoff when greater reductions are entirely possible. It is also unclear why no load reductions are allocated for municipal wastewater and industrial wastewater dischargers when these sources are clearly controllable and no uncertainty exists regarding their discharges. Board Staff’s reasoning that these sources are de minimus does not hold water because the Bay currently has no assimilative capacity for these loadings. Thus each additional loading of mercury should ideally be treated as the equivalent of a violation of water quality standards. At the least, Baykeeper is asking that there should be a significant reduction in these discharges.

These numbers do not express an adequate margin of safety given the lengthy recovery timeframe set forth in the Basin Plan Amendment. Baykeeper therefore urges Board Staff to adjust the load reductions to result in the lowest amount of mercury discharge possible in accordance with law.<sup>60</sup>

#### **H. Target Mercury Level For Bird Eggs Is Not Protective Enough**

The proposed numeric target for bird eggs of 0.5 ppm represents the lowest observable adverse effect of mercury concentration. As Daniel Russell from USFWS pointed out, however, this target will not adequately protect the reproductive capacity of some bird species, including the endangered California Clapper rail.

This target observable effect is also unacceptable because the Basin Plan amendment aims to achieve this target goal within the timeframe of the TMDL’s implementation plan. This means that the target levels will be reached sometime in the next century. Since current rates of mercury already threaten the survival of many of these species, Baykeeper cannot believe Board Staff intends for an additional hundred years of assault to further the level of irreversible damage already experienced by these endangered populations.

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<sup>58</sup> 33 U.S.C. § 1313(d). (Emphasis added.)

<sup>59</sup> 40 C.F.R. 130.7(c)(1).

<sup>60</sup> *Alaska Center for the Environment v. Reilly*, 762 F. Supp. 1422, 1429 n.8 (W.D. Wash. 1991); *aff’d Alaska Center for the Environment v. Browner*, 20 F.3d 981 (9<sup>th</sup> Cir. 1994) (recognizing timely promulgation of TMDLs as imperative, even in the face of inadequate data).

The bird egg target, therefore, should be changed from lowest observable adverse effects to no observable adverse effects to ensure that vulnerable species such as the Clapper rail are not harmed. And more protective measures must be taken in the overall implementation timeframe for mercury reductions to make it more likely that this target goal will be achieved far sooner than the current timeline.

**I. “Watershed Allocation Programs” And Credits Are Not Viable Options At This Time And Such References Must Be Removed**

The reference to pollution trading programs on page A-16 of the Basin Plan Amendment is premature and should be removed. Dischargers are not even being properly regulated under this TMDL and already Board Staff is proposing a way out. It is a violation of federal and state standards to allow increases in loadings in the absence of assimilative capacity. While Baykeeper is not entirely opposed to the possibility in the future of a well-orchestrated mercury credit policy, this Basin Plan Amendment in no way merits such a program. Before a program like this can even be considered, the TMDL will have to contain enforceable limits that represent a significant reduction in loading with meaningful penalties. There would also have to be an all inclusive inventory and implementation of key projects to target mercury hot spots and mine waste sources in order to create some possibility of assimilative capacity in the waterbody. The stakeholder process is discussing the possibility and logistics of a meaningful trading program, but unless that process is successfully completed, the mention of a trading program in the Basin Plan Amendment only confuses stakeholders and makes future dialogue about this type of program impossible. The paragraph discussing this idea in the Basin Plan Amendment is inadequate and should be removed so that no stakeholder will unwisely plan their future based on the thought that trading may be possible when a real program it is not even on the horizon.

**III. CONCLUSION**

**A. Adoption Of The Basin Plan Amendment Would Not Only Violate The CWA And SIP As Described In The Various Sections Above, But It Would Also Violate CEQA**

Under CEQA, a state or local agency must initiate environmental review prior to carrying out or approving any discretionary action that may have a significant impact on the environment.<sup>61</sup> If the agency finds that a project may have a significant effect on the environment, the agency must prepare an environmental impact report (“EIR”).<sup>62</sup> This

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<sup>61</sup> See *Friends of Westwood, Inc. v. City of Los Angeles*, 191 Cal. App.3d at 267, 269-270.

<sup>62</sup> Pub. Res. Code § 21100(a); *Bozung v. Local Agency Formation Com.* (1975) 13 Cal. 3d 263, 277-279. CEQA defines a “significant effect” as a “substantial, or potentially substantial, adverse change.” Pub. Res. Code, § 21068. This means that an activity has a significant effect if it “has the potential to degrade the quality of the environment.” See also 14 Cal. Code Reg. § 15382; *Santa Monica Chamber of Commerce v.*

includes CEQA directives that an agency consider the cumulative impacts of its project approvals,<sup>63</sup> provide timely and adequate responses to comments made by the public,<sup>64</sup> and consider feasible alternatives to the proposed action.<sup>65</sup>

The guiding principle in the review of projects under CEQA is that CEQA must be interpreted so as to afford the fullest possible protection to the environment.<sup>66</sup> EIRs and their functional equivalents under certified programs demonstrate to an apprehensive citizenry that the agency has analyzed and considered the ecological implications of its actions.<sup>67</sup> These CEQA policies are also included in the State Board's regulations.<sup>68</sup>

CEQA requires that EIRs and functionally equivalent documents identify and analyze all significant and potentially significant adverse environmental effects of the project. CEQA defines "significant effects" as any "substantial, or potentially substantial, adverse change."<sup>69</sup> This means that an activity has a significant effect if it "has the potential to degrade the quality of the environment."<sup>70</sup> The CEQA Guidelines require a mandatory finding of significance for projects that will cause "substantial adverse effects on human beings, either directly or indirectly," as well as projects with "potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species."<sup>71</sup>

The TMDL program, as described in section I(D) above, serves as the final protection for the many beneficial uses of San Francisco Bay, including water contact recreation, sport and commercial fishing, fish consumption, habitat for fish and wildlife, and preservation of rare and endangered species. Consequently, the Basin Plan Amendment determines how much protection these beneficial uses will ultimately enjoy from additional mercury loadings into an already impaired waterbody. The project here is

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*City of Santa Monica* (2002) 101 Cal. App. 4th 786, 795; *Azusa Land Reclamation Co. v. Main San Gabriel Basin Watermaster*, 52 Cal. App.4th at 1192. (Citing Pub. Res. Code § 21083.) (Emphasis added.)

<sup>63</sup> *EPIC v. Johnson* 170 Cal.App.3d at 625.

<sup>64</sup> *Id.* at 622; *Dunn-Edwards Corp. v. Southcoast Air Quality Management District* (1993) 19 Cal. App. 4th 519, 534; Pub. Res. Code § 21080.5(d)(2)(D).

<sup>65</sup> *Friends of Old Trees v. Dept. of Forestry and Fire Protection*, *supra*, 52 Cal. App. 4th at 1404-1405. *See also* Pub. Res. Code §§ 21080.5(d)(3), 21080.5(d)(2)(A)

<sup>66</sup> *Laurel Heights* 47 Cal.3d at 390; *Friends of Mammoth v. Board of Supervisors* (1972) 8 Cal.3d 247, 259.

<sup>67</sup> *Sierra Club*, 7 Cal. 4th at 1229; *EPIC v. Johnson*, 170 Cal.App.3d at 609-11. *See also* Pub. Res. Code § 21080.5(d)(3)(i)-(ii) (written documentation for a certified regulatory program shall include a description of activity, alternatives, and mitigation measures to minimize significant environmental impacts, and shall be available for a reasonable time for review and comment by the general public.)

<sup>68</sup> *See* 23 Cal. Code Reg. 3775 *et seq.*

<sup>69</sup> Pub. Res. Code, § 21068. (emphasis added.) *See also* Pub. Res. Code § 21083(a); *Santa Monica Chamber of Commerce v. City of Santa Monica* (2002) 101 Cal. App. 4th 786, 795.

<sup>70</sup> *See also* 14 Cal. Code Reg. § 15382; *Azusa Land Reclamation Co.*, *supra*, 52 Cal. App.4th at 1192.

<sup>71</sup> 14 Cal. Code Reg. § 15065. *See also* CEQA guidelines, Appendix G, § XVII ("Mandatory Findings of Significance").

to assess mercury capacity in the Bay and then allocate loads accordingly to the various sources of mercury discharges in order to meet water quality standards to protect beneficial uses of the Bay. The degree to which the Basin Plan Amendment is or is not precautionary and conservative regarding the allocation of loads will directly increase or decrease the number of beneficial uses that are protected and attained.

The Basin Plan Amendment specifically proposes to undertake this project in a manner that decreases the number of beneficial uses that are protected and attained. It does so by: 1) not implementing a reasonable timeframe for meeting water quality standards, 2) failing to require major dischargers including municipal and industrial wastewater dischargers to reduce loads to zero until assimilative capacity is made available, 3) proposing aggregate rather than individual allocations, and proposing allocations which only require a partial reduction of loads even though assimilative capacity in the Bay is zero, 4) essentially ignoring the largest sources of mercury, including air sources, the Central Valley Watershed, and Guadalupe River discharges, by not allocating meaningful loads to reduce their discharges, 5) allowing improper methods for demonstrating compliance with allocations and not imposing real consequences for exceeding allocations, 6) failing to consider meaningful actions that can be taken now to clean up existing mercury in the Bay, 7) providing for an inadequate margin of safety contrary to law, and 8) implementing target levels of mercury that are not protective of wildlife or human beneficial uses of the waterbody. These actions are not supported by the findings or by the substantial evidence in the report.

The Basin Plan Amendment fails to identify, analyze and mitigate numerous significant and potentially significant adverse environmental effects of the project. In fact, the Environmental Checklist attached at the end of the TMDL report uniformly claims that there will be “no impact” or a “less than significant impact” to numerous biological resources from allowing mercury discharges into the Bay to continue. The substantial evidence in the record and the findings do not support these claims.

The Basin Plan Amendment also fails to fully identify, analyze and mitigate significant adverse impacts to human health and ecological resources. Nor does the Basin Plan Amendment make any attempt to describe the beneficial uses that have been harmed by these impairments. For example, the Environmental Checklist does not describe the human communities who eat fish contaminated with bio-accumulative toxins, the swimmers who are put at risk by mercury loadings, or the threatened and endangered species whose success is compromised, populations diminished and habitat degraded by mercury. Further, the documents fail to include information about rising cancer rates, immuno-deficiencies and other human health problems that have been or may in the future be linked to mercury contamination.<sup>72</sup> This information must not only be

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<sup>72</sup> See, e.g., “Biomarkers of Environmentally Associated Disease, Technologies, Concepts, and Perspectives,” Lewis Publishers, CRC Press LLC, 2002; Ted Schettler, M.D., Gina Solomon, M.D., Maria Valenti, and Annette Huddle; *Generations at Risk, Reproductive Health and the Environment*, MIT Press, 1999; Michael C., Newman and Michael A. Unger; *Fundamentals of Ecotoxicology*, Lewis Publishers,

identified in the Environmental Checklist or accompanying documents, but since there is substantial evidence demonstrating that these are potentially significant impacts that can occur from continued mercury loadings, these impacts must also be mitigated. The documents fail to implement any mitigation measures, especially with regard to impacted communities and wildlife.

Additionally, the Basin Plan Amendment fails to adequately describe the environmental setting of the project. The setting as described in the Environmental Checklist and TMDL report falls far short of CEQA's requirements. CEQA requires a full description of the environmental setting in which a project occurs. These documents fail to describe California's widespread pollution problems and degraded beneficial uses and the cumulative impact that additional mercury loadings may have on an already stressed environment. As such it is inadequate under the law. The Court found that in the absence of such a description, it is "impossible for the [EIR] to accurately assess the impacts the project will have on wildlife and wildlife habitat or to determine appropriate mitigation measures for those impacts."<sup>73</sup>

The Basin Plan Amendment makes no effort to describe or to mitigate the widespread violations of standards and mercury impairments in the watershed. Instead, the documents compound the problem by further allowing violations of standards for at least another 120 years. Board Staff does this through a failure to allocate load reductions to wastewater dischargers, by only requiring partial load reductions for stormwater discharges, and by failing to adequately manage loadings from known sources such as air sources, Central Valley dischargers, and Guadalupe River dischargers.

The Basin Plan Amendment fails to include a statement of overriding considerations. As described above, adoption of the Amendment as written will result in numerous significant and unmitigated adverse environmental impacts. In this circumstance, Board Staff must balance the economic benefits of the project against its environmental harm to determine if the project should proceed.<sup>74</sup> This "statement of overriding considerations," as the last step in the analysis, provides critical information to the public to fulfill the law's public disclosure requirement - that the [functionally equivalent document] function as "a document of accountability" and "informed self government."<sup>75</sup> However, CEQA requires that the agency first identify the adverse effects of the proposed project before it exercises that power.<sup>76</sup> No statement of

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CRC Press, 2003; Jones-Lee & Lee; "Methylmercury: Epidemiology Update," USEPA, Presentation to Fish Forum in San Diego (2004); USFDA, "Draft Advice For Women Who Are Pregnant, Or Who Might Become Pregnant, and Nursing Mothers, About Avoiding Harm To Your Baby Or Young Child From Mercury in Fish and Shellfish" (Dec. 10, 2003).

<sup>73</sup> *San Joaquin Raptor v. County of Stanislaus* 27 Cal. App. 4th at 722-723.

<sup>74</sup> Pub. Res. Code § 21081(d); 14 Cal. Code Reg. § 15903.

<sup>75</sup> *Sierra Club, supra*, 7 Cal.4th at 1229 (...the board retains the power to approve a plan that has significant adverse effects upon the environment, so long as it justifies its action in light of "specific economic, social, or other conditions;" Pub. Res. Code § 21002.)

<sup>76</sup> *Id.* at 1233.

overriding considerations is presented in the Basin Plan Amendment. Moreover, the Basin Plan Amendment repeatedly rejects mitigation measures fails to consider alternatives while selecting options, which favor economic and cost factors and increase the risk of adverse environmental impacts. These choices are not permissible, and are certainly unjustified in the absence of a statement of overriding considerations.

### **B. Adaptive Management Sounds Like A Good Idea, But It Does Not Seem To Be Used To Its Full Potential**

While Baykeeper supports the concept of adaptive management as set forth by Mr. Thomas E. Mumley and Mr. Richard Looker in the 2004 Pulse of the Estuary RMP Report, we do not believe this Basin Plan Amendment actually applies the idea adequately. At this time, adaptive management is poorly understood by the public and dischargers because it has no institutional basis. The proposed Basin Plan Amendment refers to the idea in terms of “collaboration with stakeholders” but only in the context of “opportunities for participation” and to develop “focusing questions.”<sup>77</sup> Unfortunately, this description suggests that Board Staff will approach adaptive management of this TMDL in a way that is too similar to its existing problematic practices. As is evidence in various comments from stakeholder groups, this business as usual approach may not reflect the different expectations or desires of the many stakeholders.

The success of adaptive management depends on a high level of active participation and mutual trust among stakeholders, a strong commitment (including funding) to an appropriate institution that can guide the process, and organizational change within the agency to support the stakeholder process. Baykeeper does not see any of these characteristics in the Basin Plan Amendment.

Scientific uncertainty has been used by polluters and regulators as a rationale for inaction for decades. These polluters and regulators take advantage of scientific uncertainty by interpreting a scientific “we don’t know” as “the science says it’s OK.” By permitting dischargers to proceed unrestrained until all data is available, this approach creates disincentives for them to undertake such investigations.<sup>78</sup> These precise disincentives are evident in the Basin Plan Amendment’s proposals. By allowing mercury loads to continue – despite known harm to human and environmental health and despite a lack of assimilative capacity – until more information is available, the Basin Plan Amendment creates disincentive for dischargers to conduct much-needed research and development of new technologies.

At their very core, adaptive management and a precautionary approach are all about dealing with uncertainty. Uncertainty in science is pervasive; the elimination of

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<sup>77</sup> Proposed Basin Plan Amendment at A-16.

<sup>78</sup> *Id.*

scientific uncertainty is impossible.<sup>79</sup> However, the Basin Plan amendment is replete with provisions that favor tolerance of environmental risk in the name of “adaptive management.” If adaptive management is manipulated to mean business as usual, then Board Staff should just avoid any attempt to sugar coat the truth: in the face of uncertainty, the Board is failing to take meaningful action to protect humans and wildlife from known harm. The Basin Plan Amendment in essence, is using the lack of scientific certainty related to impairment as an excuse for inaction: exactly the opposite of what adaptive management and a precautionary approach stand for.

An approach with more foresight would establish that “[w]here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”<sup>80</sup> There are few policy decisions where it is more critical to employ the precautionary principal than those embodied in this Basin Plan Amendment: the reduction of mercury pollution to healthy levels in the Bay. TMDLs are our last line of defense in the protection of our waterways and are applied only after other Clean Water Act provisions have failed.<sup>81</sup> As such, it is all the more important that this Basin Plan Amendment ensure that all potential mercury discharges to waterways are identified; the consequences of ignoring them include threats to human health and aquatic life, and if these discharges are ignored by the 303(d) program, they are ignored altogether.

An important first step toward adequate implementation of foresight and adaptive management, as we understand it, is full disclosure: decision-making processes need to clearly identify and evaluate areas of uncertainty, and all unknown but potential risks should be clearly articulated. An unknown cost should not automatically be assigned a value of zero merely because its extent or causalities are not yet completely understood. Policies should encourage an open and public debate about the various interests that could be impacted by the uncertainty and the tradeoffs between them. In the absence of this disclosure, the public is ill-equipped to evaluate its tolerance for the uncertainties inherent in this environmental policy.

### **C. Key Points**

Baykeeper does not believe this Basin Plan Amendment lives up to the Board’s responsibility to implement the CWA and to protect human health and aquatic ecosystems. It is known that mercury is causing harm, yet this Basin Plan Amendment allows all major dischargers to continue to discharge mercury in the absence of assimilative capacity, and not one dollar is being spent to clean up the existing contamination or to solve the major sources. Additionally, it will be impossible, if not meaningless, for the Board to enforce this amendment as proposed. This flaw means less

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<sup>79</sup> NRC Report at 4.

<sup>80</sup> Principle 15 as adopted by the United Nations Conference on the Environment and Development in Rio de Janeiro, 1992.

<sup>81</sup> See 33 U.S.C. § 1313(d)(1)(A).

accountability for the known and controllable sources of mercury and thus less likelihood of success to achieve mercury reduction. For these and the forgoing reasons, the Baykeeper urges the Board to:

- 1) Assign individual, daily waste load allocations of zero to all dischargers until assimilative capacity is available (or at least promulgate individual daily limits that will eventually lead to zero loadings or to the creation of assimilative capacity in the Bay);
- 2) Proactively manage aerial sources of mercury pollution and Central Valley discharges as well as set the direction and pace of the Guadalupe River TMDL;
- 3) Assign real penalties for failures to comply with allocations (in line with the CWA) and allocate this money for the clean up of leaching mining sites and/or existing hot spots of sediment contamination;
- 4) Implement creative strategies towards dealing with bed erosion and cleaning up some of the mercury problem now;
- 5) Meaningfully manage the threats to the at-risk human populations and wildlife most impacted by mercury pollution, and
- 6) Delete all references to an unlikely pollutant trading program.

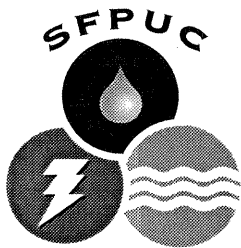
The Basin Plan amendment, as proposed, is legally inadequate and its adoption, as an incomplete entity, will not fulfill the Board's obligation to implement a TMDL for mercury in the Bay. These actions are the least the Board can do in order to ensure that it has done all it currently can to protect our watershed and communities from additional mercury exposure. Baykeeper does not believe it is too much to ask that this Basin Plan Amendment be a good-faith attempt to reduce existing mercury problems within our lifetime.

Thank you for your time and consideration. If you have any questions, please call.

Sincerely,

/SC/

Sejal Choksi  
San Francisco Baykeeper



**WATER**  
**HETCH HETCHY**  
**WATER & POWER**  
**CLEAN WATER**

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ACTING  
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## **SAN FRANCISCO PUBLIC UTILITIES COMMISSION**

PLANNING BUREAU

1145 Market Street, Suite 401, San Francisco, CA 94103 • Tel. (415) 934-5700 • Fax (415) 934-5751



June 14, 2004

Bill Johnson, Environmental Scientist  
Richard Looker, Water Resources Control Engineer  
San Francisco Bay Regional Water Quality Control Board  
1515 Clay Street, Suite 1400  
Oakland, CA 94612  
by e-mail: [bjj@rb2.swrcb.ca.gov](mailto:bjj@rb2.swrcb.ca.gov) ; [rel@rb2.swrcb.ca.gov](mailto:rel@rb2.swrcb.ca.gov)

**Subject:** Mercury in San Francisco Bay - TMDL and Proposed Basin Plan Amendment (April 30, 2004)

Dear Messrs. Johnson and Looker:

The San Francisco Public Utilities Commission (SFPUC) appreciates the opportunity to comment on the TMDL Project Report and Basin Plan Amendment for mercury in San Francisco Bay. The strong commitment and the quality of work by you and other Board staff is evident in these documents. We additionally appreciate the public outreach program and the sincere effort to involve all interested parties in this TMDL.

We have several comments on the TMDL and Basin Plan Amendment:

*1. Credit for treatment of stormwater by San Francisco's wastewater control facilities*

On July 14, 2003, we submitted comments on the June 2003 draft of the TMDL. We requested that the TMDL incorporate a credit for San Francisco's removal of mercury from stormwater. This credit would recognize that San Francisco's treatment facilities remove a substantial portion of the mercury carried in runoff from San Francisco's streets and other impervious surfaces. This draft of the TMDL does reference a credit for San Francisco's stormwater treatment and we appreciate this addition.

San Francisco's combined sewer system and associated treatment facilities capture and provide treatment for nearly all of the stormwater runoff in the City. (Untreated runoff does occur from several small separately sewered areas.) As a result, approximately two thirds of the wet weather flows are treated to secondary treatment standards. The remaining wet weather flows receive either primary treatment or the equivalent to primary treatment within the wastewater system storage/transport. The result of San Francisco's treatment of stormwater is that an estimated 60% of the solids in the stormwater are removed from the waste stream (measured as total suspended solids). Mercury in wastewater has a strong affinity for particulates which can then be removed by standard treatment. If we assume that most of the mercury in the stormwater runoff is associated with particulates, then stormwater treatment should provide major benefits.

This revised draft TMDL maintains approximately the same allocation (8.8 kg/yr) and load reduction (8.4 kg/yr) for San Francisco as the earlier July 2003 draft. However, this most recent draft has added a footnote in Table 7.2 (page 55) which acknowledges the treatment provided:

*<sup>e</sup> The urban stormwater runoff load estimate does not account for treatment provided by San Francisco's combined sewer system. This treatment will be credited toward meeting the allocation and load reduction. This allocation includes Bayside CSO (CA0038610) and Northpoint CSO (CA0037672)*

Some editing is necessary for this footnote since the Bayside permits were combined in 2002 into a single permit: Order No. R2-2002-0073; NPDES No. CA0037664. The last sentence in the footnote could be replaced by:

*This credit is based on the treatment (mercury removal) provided to stormwater runoff by the Bayside facilities regulated by NPDES permit CA0037664.*

This new wording addresses the fact that stormwater receives treatment at the Southeast treatment plant as well as at the North Point wet weather facility and within the storage/transport.

We appreciate the addition of the footnote to the table. It is appropriate to incorporate and identify the fact that San Francisco provides treatment to stormwater and thereby reduces the loading of mercury to the Bay.

## *2. Municipal wastewater allocation for San Francisco*

San Francisco's NPDES wastewater permit issued in 2002 (CA0037664) includes an interim water quality-based effluent limitation as well as a mass limitation. The mass limitation is 0.3 kg/month and is enforced as a 12-month moving average. This mass limitation is the equivalent of 3.6 kg/year. However, the allocation assigned to San Francisco in Table 7.3 (page 57) is 2.27 kg/year. This represents a 37% reduction in the allowable discharge.

The TMDL notes that POTW allocations were computed on the basis of each facility's fraction of the entire municipal wastewater category mercury load. Both the permit mass limit and TMDL mass limit are intended to be performance-based limitations and we are not sure why the permit value should differ from the limitation based on apportionment of the bay-wide POTW loadings. Regardless, the limitation derived by the permit is directly based on historical plant performance and would appear more appropriate.

In addition, San Francisco's Southeast treatment facility has an additional and unique treatment burden. After wet weather, the stormwater solids are trapped in the storage/transport. Over time these are drained along with the day-to-day wastewater flow to the treatment plant. This flow, including the wet weather solids, is treated to secondary treatment standards and approximately 90% of the solids are removed. Nevertheless, this additional loading means that San Francisco has to manage and control a proportionally larger mercury loading than other Bay area POTWs which do not treat the flows in their storm drains. This additional loading was taken into account during the process of calculating the permit's performance-based mass

limitation. However, a more restrictive limitation, as proposed in the draft TMDL, becomes a regulatory disincentive to the City's effort to direct more captured run-off to the Southeast plant. Storing the runoff and directing it through the plants treatment facilities is environmental beneficial but could be constrained by a more restrictive mass limitation.

From discussions with Board staff we understand that there will be an opportunity to review these POTW mass limitations prior to final board adoption in September. We look forward to these discussions.

### *3. Compliance with water quality-based effluent limits (for POTW effluent)*

An additional comment concerns the potential that San Francisco, as well as the other POTWs, may not be able to comply with mandatory water quality-based effluent limits (WQBEL) when the TMDL is adopted.

As you may know, our Bayside NPDES permit includes an interim limit for mercury (0.087 ug/L). The interim limit was necessary because the Board concurred that it is infeasible for the discharge to immediately comply with the calculated final effluent limitations for mercury (0.02 ug/l – AMEL). This adopted interim limit of 87 ng/L was exceeded 4 times during 136 sampling events in the period preceding permit adoption. It was the Board staff's best professional judgment that the interim limit of 87 ng/L is attainable.

Because of the inability to meet the calculated final limit the permit included the interim limit and also established a compliance schedule for meeting the mercury limitation. Because the calculated final mercury limitation is derived from a Basin Plan numeric objective (0.025 ug/l) the compliance schedule extends to March 31, 2010. (The CTR value is 0.051 ug/l.) The permit noted that the actual final limitation would likely be based on the TMDL/WLA established for mercury rather than the calculated value.

We are concerned that the TMDL allocations will not be allowed to be substituted for the site-specific WQBELs. In other words, the TMDL allocations, with which most POTWs can comply, may not be able to be used in permits in lieu of calculated final limits based on Bay water quality objectives. The Clean Water Act and EPA regulations indicate that a WQBEL can only be adjusted or replaced if the TMDL provides for attainment with water quality standards. This TMDL projects a compliance date 120 years in the future and obviously many NPDES permits cycles will occur before compliance with standards is attained.

U.S. EPA expressed a similar concern in their letter of September 8, 2003. They state that the TMDL must specify that numeric WQBELs will be used to ensure that localized exceedances do not occur. In other words, they do not appear to agree with the approach of using the waste load allocations to replace WQBELs derived from the water quality objectives. The Board's response (February 13, 2004) disagreed with EPA assertions, however, we note that EPA must approve the TMDL and may be able to enforce its interpretation.

If the TMDL is approved and does not provide relief from WQBELs then the San Francisco Bay POTWs will be required to comply with the final mercury concentration limitations identified in their permits by the end of the permit compliance schedules. San Francisco would have six years to come into compliance. The operators of many POTWs believe these final limits are not

attainable using the existing treatment facilities. New treatment facilities would likely be required. Tertiary treatment is expensive to build and operate. Since POTWs currently contribute 1% or less of the mercury loading, this additional treatment would provide marginal reductions in total loading and negligible benefits to the Bay.

Given the problematic likelihood of the TMDL in its current form resolving this issue, we propose that it be held in abeyance until an approach is developed, with agreement from EPA, to address this issue.

#### *4. Credit for mercury reductions by jurisdictions which have aggressively addressed mercury in the past*

It is not clear from the TMDL if communities will get credit for mercury diversion efforts they have already put into place. Proactive mercury control programs should not have the effect of "moving the goal posts." Otherwise the proactive communities will have much more difficulty meeting their assigned load reduction requirements because they have already implemented the controls suggested in the TMDL. Unless credit is given for these earlier efforts, communities that have lagged behind in addressing mercury will be in a much better position because they will have more opportunities implementing mercury controls and documenting their reductions.

San Francisco has a very pro-active mercury reduction program and was the first in the Bay area to initiate an effort to remove mercury thermometers as well as to control mercury in other products including paint. San Francisco is also one of the first to address dental mercury. San Francisco will continue with these pollution prevention efforts but should receive credit for these control efforts implemented prior to completion of the TMDL.

#### *5. Need to address atmospherically deposited mercury*

The TMDL estimates that approximately 30% of the mercury carried in stormwater results from atmospheric deposition. The San Francisco Estuary Institute report - *San Francisco Bay Atmospheric Deposition Pilot Study* – concluded: "Comparing to other sources and pathways, loading of mercury from atmospheric deposition (combined direct and indirect routes) contributes almost seven (7) times as much as the loading from wastewater discharges." (July 2001). The TMDL suggests that stormwater agencies direct their efforts toward "hot spot" identification and cleanup as well as pollution prevention. The 30% atmospherically deposited mercury is essentially outside the capability of stormwater agencies to address by these suggested controls. The TMDL does not assign any reduction to mercury from atmospheric deposition. Given the importance of this source, we suggest that the TMDL specify measures by other state agencies (e.g., ARB) and the U.S. EPA to address this source.

#### *6. Apportionment based on population*

The stormwater allocations are based on population. However, the sources of mercury in stormwater runoff are not strongly correlated with population. As discussed above, 30% of the stormwater runoff comes from atmospherically deposited mercury which suggests an apportionment based on area. In addition, the TMDL proposes that land-based hot spots are sources which also suggests an apportionment based on area. We suggest that it may be appropriate to base the apportionment partly on land area and partly on population.

Bill Johnson, Environmental Scientist  
Richard Looker, Water Resources Control Engineer  
June 14, 2004  
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We appreciate your attention to these comments. If you have any questions please do not hesitate to contact me at (415) 934-5787.

Very truly yours,

A handwritten signature in black ink, appearing to read "M. P. Carlin", with a long horizontal flourish extending to the right.

Michael P. Carlin  
Planning Bureau Manager

cc: Cheryl K. Davis, Acting General Manager, SFPUC  
Bruce Wolfe, Executive Officer, SFBRWQCB  
Thomas Mumley, SWRCB



**Testimony for June 16, 2004 Mercury Basin Plan Amendment Workshop**  
**Carl Mosher, Director, City of San Jose - Environmental Services Department**

My name is Carl Mosher, Director of San Jose's Environmental Services Department. I will be speaking on behalf of the San Jose/Santa Clara Water Pollution Control Plant and San Jose's Urban Runoff program. The City of San Jose acknowledges that mercury is an important priority in the watershed and supports a reasonable approach to protecting beneficial uses.

**POTW Concerns:**

I'll begin with treatment plant issues. I stood here about a year ago to request that Water Board staff revisit the way mercury was being regulated in our draft NPDES permit. At that time, the Regional Board stated that they did not want to penalize good performers or cause compliance issues for our treatment plants, because the Plants contribute minimal amounts of mercury to the Bay. The mercury issue was then addressed in our permits using an interim mass and concentration limits that were not punitive and were acceptable while waiting for the TMDL to be completed.

The Plant has been successful in reducing mercury and volunteered to conduct a special study that would support this Bay-wide Mercury TMDL effort as part of the South Bay stakeholder process. The City has actively participated and supported the CEP financially and through in-kind services. However, we were all completely surprised by the direction taken in this final staff report.

Dramatic changes to our Plant's allocation from 3.23 kg/yr. down to 0.49 kg/yr. (85% reduction) are now being proposed with little opportunity for review or discussion. Not only were we not told of these changes before the report was published, the total proposed allocation for all Bay Area treatment plants has been reduced without technical analysis or input from any of the municipal dischargers. The City of San Jose is extremely concerned about the POTW wasteload allocations and the lack of reasonable implementation mechanisms contained in this staff report.

As you can see in this slide (**Slide 1**), our Plant's contribution to mercury in the Bay is minimal, less than 0.02 percent of the total loading to the entire San Francisco Bay. The final allocation scheme used by Water Board staff is based on recent past performance, and therefore penalizes treatment plants that have implemented advanced treatment, water recycling and water conservation programs for many years. Such allocation schemes provide a disincentive for any other plants to be proactive and implement such programs because their future wasteload allocations would be affected.

In addition, the allocation scheme limits economic recovery, as it represents only the most recent data during a time of recession. As this slide shows (**Slide 2**), our Plant would not have been able to meet its allocation during better economic times. Future economic recovery must be addressed not only for this TMDL but also for future TMDLs, particularly when considering that the treatment plant does not significantly contribute to the mercury problem in the watershed. Otherwise, economic recovery efforts in our community will be crippled and we may be forced to implement mercury reduction efforts that are not only extraordinarily costly, but would provide no real water quality benefit.



To address these concerns, San Jose requests that Water Board staff be directed to re-examine the total POTW allocation and to develop alternative POTW allocations with BACWA and any interested POTW stakeholder to achieve an allocation scheme that is acceptable and equitable to all POTW stakeholders. We believe a solution can be reached on this issue.

### **Urban Runoff Concerns**

With respect to Urban Runoff, the City, as a member of the Santa Clara Valley Urban Runoff Pollution Prevention Program (Program), generally supports the comments that are being submitted on behalf of the Program and those being made by the Bay Area Stormwater Management Agencies Association (BASMAA). San Jose believes there are many remaining scientific questions and large technical uncertainties that affect the loading and proposed reduction estimates in this TMDL and I'm just going to touch on a few here today since others will be covering Urban Runoff concerns in more detail.

First, the basic assumption that there is a linear relationship between a reduction in total mercury in sediment and methylmercury in fish tissue is speculative and will likely lead to efforts that are inefficient and most importantly, ineffective.

Second, the load allocations and proposed reductions from Urban Runoff are based on sediment loads and mercury concentrations in bedded sediment that overestimate the urban runoff contribution. The loading estimates also include uncontrollable sources like air deposition, which are outside of control of local government. Urban Runoff loads should be recalculated removing air deposition and instream and hillslope erosion; instead, these sources should be in separate categories.

Finally, San Jose has significant concerns regarding the feasibility, costs, and environmental benefits of the current allocation scheme and implementation timeline for Urban Runoff. San Jose believes the required reductions allocated to urban stormwater are technically infeasible, costly and may not result in an appreciable improvement to the Bay.

It is imperative that we establish a course of action to reach agreement on this and upcoming TMDLs and allocations for legacy pollutants, many of which will require decades before any improvements may be seen. Therefore, I request that the Water Board allow more time to finalize the Mercury TMDL and Basin Plan amendment using a collaborative approach. San Jose has already voluntarily funded the successful stakeholder approach used to resolve copper and nickel issues in the South Bay. This level of funding is no longer possible, but we are willing to contribute an equitable share towards regional solutions for Bay-wide contaminant issues. San Jose advocates the formation of a Legacy Pollutant Collaborative, a stakeholder supported partnership to reduce technical uncertainties and develop the implementation strategies needed to move forward with TMDLs like the San Francisco Bay Mercury TMDL.

San Jose champions a TMDL that protects the environment, our citizens, and our economy. We look forward to continued collaboration with your staff to complete the Bay-wide Mercury TMDL, one that is adaptive, effective and reasonable. Thank you.

## County of Santa Clara

Environmental Resources Agency  
Office of Development Services

County Government Center, East Wing  
70 West Hedding Street, 7th Floor  
San Jose, California 95110

Bldg. Inspection (408) 299-5700 Land Development 299-5730 FAX 279-8537



June 14, 2004

Mr. Bill Johnson and Mr. Richard Looker  
California Regional Water Quality Control Board  
San Francisco Bay Region  
1515 Clay Street, Suite 1400 (Via Facsimile: 510-622-2460)  
Oakland, CA 94612

**Re: Mercury in San Francisco Bay Total Maximum Daily Load  
(TMDL) Proposed Basin Plan Amendment and Staff Report**

Dear Mr. Looker and Mr. Johnson:

I am submitting this letter as the Coordinator of the Santa Clara County Nonpoint Source Pollution Control Program (NPS Program), regarding the "Mercury in San Francisco Bay Total Maximum Daily Load (TMDL) Proposed Basin Plan Amendment" (BPA) and the associated Staff Report, dated April 30, 2004. Thank you for this opportunity to comment.

The County NPS Program concurs with the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) technical and legal comments regarding the proposal. It is respectfully requested that the Regional Board direct its staff to significantly and fundamentally revise the TMDL, its implementation plan, and the associated proposed Basin Plan amendment to address the concerns delineated in the SCVURPPP comments.

Very truly,

Steve Homan  
NPS Program Coordinator

CC: SCVURPPP Management Committee

# County of Santa Clara

Environmental Resources Agency  
Parks and Recreation Department

298 Garden Hill Drive  
Los Gatos, California 95032-7669  
(408) 355-2200 FAX (408) 355-2290  
Reservations (408) 355-2201  
[www.parks.clr.org](http://www.parks.clr.org)



June 14, 2004

**BY FACSIMILE AND FIRST CLASS MAIL**

Mr. Bill Johnson  
Mr. Richard Looker  
California Regional Water Quality Control Board, San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

Dear Messrs. Johnson and Looker:

The County of Santa Clara ("County") presents these comments on policy and technical considerations regarding the above-referenced TMDL and related implementation plan, dated April 30, 2004. The Santa Clara Valley Urban Runoff Pollution Prevention Program ("SCVURPPP"), of which the County is a member, has also submitted comments on both technical and legal issues with respect to the TMDL and proposed Basin Plan Amendment. The County supports and adopts those comments, both legal and technical. The County's comments here reiterate the general concerns expressed about the fairness and adequacy of the proposed TMDL and its implementation plan, and provide additional technical comments supporting the legitimacy of those concerns.

Briefly, the County's review of the TMDL report and supporting materials indicates that the TMDL is based on assumptions with no or questionable support in current science, leading to a flawed implementation plan. The County recognizes that the development of a defensible TMDL for mercury in the San Francisco Bay in a relatively short time period is a difficult, if not impossible, task, given the state of knowledge regarding mercury in the environment, and the resource limitations of the agencies. To address the substantial gaps in data and understanding of both the Bay system and the mercury in the system, staff of the Regional Board have incorporated a patchwork of information and data from disparate sources and varying time periods, and rest their central conclusions on the validity of several critical assumptions, chiefly that addressing total mercury loading to the Bay will produce similar reductions methylmercury loading, and likewise reduce mercury impacts on fish and wildlife (birds).

The impact of those assumptions extends to the nature of the implementation plan. The report does not identify or examine alternative approaches to addressing the mercury concerns in the Bay, in terms of cost, effectiveness or -- critical for CEQA purposes -- potential for collateral environmental impact. Indeed, the TMDL report neither addresses alternative approaches, nor adequately addresses whether the allocations assigned are attainable at any cost, let alone at a reasonable cost, and ignores



Board of Supervisors: Donald E. Gage, Blanca Alvarado, Pete McHugh, James T. Beall, Jr., Liz Kniss  
County Executive: Peter Kupas, Jr.

the potential that incorrect assumptions will lead to heavy expenditures on activities that have little or no impact on the identified problems.

These are not trivial issues. The County removed a substantial volume of calcine materials from the former mining areas in 1997-1999. The Santa Clara Valley Water District has also conducted substantial activities within the past five years that removed significant amounts of mercury. Accordingly, with remaining mercury material within the Guadalupe River Watershed dispersed widely along the waterways and at low concentrations, it is not at all clear that it would be practically feasible to control any significant percent, let alone 98%, of future releases to water from remaining mercury material.

The SCVURPPP comments and related submissions address most of the County's legal and factual concerns and will not be repeated in detail here. The County's concerns can be quickly summarized in a series of questions.

### **Are we addressing the right objective?**

- The TMDL is addressing a problem that arises from methylmercury, through implementation aimed at total mercury.<sup>1</sup> There is no direct correlation between the two forms of mercury, as discussed in the attached technical comments of Dr. Terry Cooke, Senior Project Chemist at URS, a well-respected national environmental consulting firm. Absent an understanding of the relationship of the two forms in the context of the Bay environment, agencies cannot make a reasoned choice among alternative actions aimed at reducing the impact of methylmercury. Thus the TMDL may require expensive implementation directed to total mercury, and have no effect on resource exposure to methylmercury, or on attainment of the TMDL's goals for fish and birds. The implementation of such efforts, however, would squander limited resources and divert efforts to fully understand the methylation process, and may have significant adverse collateral impact on the environment, such as may result from extensive dredging.

The proposal is also inconsistent with the approaches taken in other mercury TMDLs under the Central Valley Regional Board, which is responsible for addressing the inputs identified as the major mercury sources to the Bay. However, the TMDL report also does not address how that difference in approach -- one aimed at total mercury, one at methylmercury -- may affect achievement of the targets adopted for the Bay. In fact, the TMDL is devoid of any alternatives discussion consistent with the spirit and intent of CEQA, despite the fact that the document purports to be the "functional equivalent of a CEQA analysis.

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<sup>1</sup> "The organic form of mercury (methylmercury) is toxic and bioavailable, but information on ways of controlling methylmercury production is limited." Proposed Basin Plan Amendment, p. A-1.

Particularly in a time of stringent fiscal restraint, it would seem that better understanding upfront of the mercury and the methylation process would better serve the public interest.

### **Are we looking at the right target endpoints?**

- The TMDL addresses two endpoints: concentrations in fish tissue and concentrations in bird eggs, calling for reduction of mercury levels in both to specific numeric levels. However, for birds, the technical studies relied upon in the TMDL are not in fact adequate to support a claim that mercury in the Bay is the source of any impact on that resource, because, e.g., of their failure to take into account differences in species and foraging patterns. Nor are those studies adequate to establish that attaining the proposed target for mercury would provide any benefit to bird species or other wildlife. This is addressed more fully in the attached comments provided by Dr. Adrian del Nevo, a highly-regarded expert on avian issues, with direct and continuing experience with the species discussed in the TMDL report, including experience with those species in the Bay Area, both as a consultant on those issues for the County and as an active participant in Bay Area conservation organizations.

### **Are we looking at the right water body?**

- For ease of analysis and implementation, the TMDL uses a “whole bay” approach, which ignores a variety of very substantial differences between the South Bay and the remainder of the Bay. Averaging out data or making the assumption that significant processes affect all parts of the Bay in the same fashion affects the entire analysis by which the plan has been developed. Those differences may also mean that a similar “one size fits all” approach to manner of implementation will be both wasteful and in many instances ineffective.

### **Are we looking at the right data?**

- The allocations for the Bay segments, including the Guadalupe Watershed, are based on mercury and sediment data sets that are not consistent, and that do not incorporate either changes over time in the Bay, or the impact of more recent events, including the County’s removal of over 100,000 cu. yds. of calcine (mercury mining waste) material from the Guadalupe River watershed. The TMDL process is a “forward looking” effort. The baseline for that effort should incorporate a reasonably current understanding of watershed conditions.

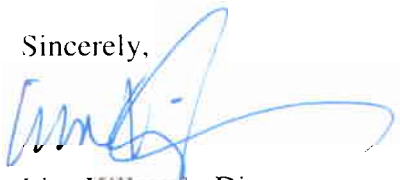
## Are the assigned allocations attainable, and fair?

- The allocations for the Guadalupe River Watershed, which are based on mercury targets and loading estimates, do not include any analysis of whether those levels could be achieved at any cost, let alone at a cost bearing a reasonable relationship to the expected benefit. Because we do not know what effect removal of total mercury will have on the real concern – methylmercury – all we know is that, attainable or not, effective or not, these efforts at removal will be expensive. The County spent over \$6 million in remediating mercury contamination at Almaden Quicksilver Park, removing over 100,000 cu. yds of calcines from along creeks in the watershed.<sup>2</sup> That remediation, moreover, represents the great bulk in terms of removal of significant calcine deposits.

The County does not believe that it is reasonable or appropriate for the Board to adopt the proposed TMDL and Basin Plan Amendment, given the high degree of uncertainty regarding the nature of the problem being addressed, the fairness of allocations, and the effectiveness of proposed implementation activities. These are not matters which can simply be handled through an “adaptive management” approach five or ten years into this process. If the matter moves forward as proposed, substantial amounts of funding may well be expended on efforts that will produce no benefit in terms of the mercury, and would also inevitably entail – as a result of dredging or other removal actions --substantial environmental impacts on other resources. Again, the TMDL does not even purport to address the likelihood of such collateral impacts.

There is an alternative, proposed by in the SCVURPPP comments, but not discussed in the TMDL report. This TMDL should move forward in stages, as our understanding of the Bay processes and the chemistry increases, and we attain the ability to evaluate both the benefits and costs of implementation activities. At a minimum, a phased approach will facilitate the efficient and effective use of limited public resources, and informed efforts at addressing the problems of mercury may in fact speed the ultimate restoration of the affected beneficial uses.

Sincerely,



Lisa Killough, Director  
Santa Clara County Department of Parks and Recreation

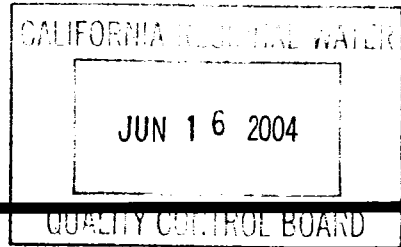
cc: Kathryn Berry, Gerald F. George, Terry Cooke, Adrian del Nevo

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<sup>2</sup> While the practical import of “recognition” as used in the TMDL is unclear, the County will have spent over \$6 million to clean up the areas containing the largest volumes of calcines in the Guadalupe River Watershed, but will receive no “recognition” for that activity, because the remediation concluded in 1999, before the 2001 date in the proposed Basin Plan Amendment.

# Memorandum

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**Applied Ecological Solutions Inc.**

3092 Copa de Oro Drive

Rossmoor, CA 90720

Tel: (562) 431-1735

Fax: (562) 936-1414

E-mail: [adrian.delnevo@gte.net](mailto:adrian.delnevo@gte.net)

**Date: June 14, 2004**

**Re: Comments on the San Francisco Bay Mercury TMDL, April 30, 2004.**

## **General Comments**

- 1. Inconclusive/inconsistent use of information on the relative contribution of total mercury versus methylmercury.** The report's commentary on mercury and mercury impacts is frequently vague on this point, and does not always distinguish between the status, distribution and alleged effects associated with total mercury versus methylmercury. This is a critical concern, because methylmercury is the toxic and bioavailable form. The report should clearly state whether data and interpreted effects are associated with total mercury or methylmercury. The appropriate approach to addressing the contamination could vary greatly (in nature, cost and effectiveness) depending on which is the concern. In the absence of a clear recognition of these important distinctions, the existing document fails to provide sufficient information upon which any decision on management of alleged contaminant load could be made.
- 2. Incomplete and inconclusive understanding of past sources of mercury and how these sources may have changed over time.** The document provides scant information on past sources of mercury contamination and inadequately considers the contribution made by other sources, such as road run-off or air contamination. Moreover, the report fails to consider how each and all of these respective sources of mercury may have changed in space and over time and the degree to which they may become available to human or wildlife receptors. The TMDL process is intended to govern load reductions into the future to restore beneficial uses now not available. The absence of a good understanding of current conditions within the Bay significantly affects the credibility of the allocation process, and the ability to make an appropriate selection of effective implementation techniques
- 3. Incomplete and inappropriate consideration of the Bay's water circulation system and the effect this has on the distribution and deposition of different mercury sources with the Bay.** The report inadequately considers the dynamic circulatory system within San Francisco Bay and the effect this may have on the distribution, accumulation, mixing and concentration of sediments and their potential contaminant load. Furthermore, the report inadequately considers the effect of large river surge events (e.g., following periods of substantial flooding along the Sacramento River) and also changes within the Bay

ecosystem following El Nino events, both of which are likely to influence the mobilization of sediments and the subsequent distribution of contaminants. The report also inadequately considers the release of contaminated sediments from major dredging programs within the Bay and the routine dredging at the entrance to the Bay near to the Golden Gate Bridge.

## **Bird-Specific Comments**

- 1. Target level for wildlife based on species with a dramatically different feeding and foraging ecology.** The wildlife target level of 0.5 ppm is based on feeding studies involving a bird species (mallard) that has significantly different foraging behavior and foraging ecology<sup>1</sup> than the species of concern within the Bay.

The report in identifying the Bay as the source of mercury contamination in bird species, inadequately, and in some cases incorrectly, addresses the role of individual and/or species-specific foraging behavior. The report frequently refers to egg data as coming from certain locations within the Bay, but fails to consider the foraging range, foraging behavior, and individual dispersal of many of the species involved. In the absence of an unequivocal link between a mercury source, the take-up of food items exposed to that source, proven contaminant levels within the food, and subsequent contaminant levels in the egg, we believe that the report's assumptions regarding the source and impact of contamination are inappropriate and misleading.

The report fails to mention that the tern species (Caspian tern) that allegedly has the highest mercury contamination is a migratory species and is thus exposed to mercury contamination elsewhere. Additionally, Caspian terns are one of the most deep diving species of the tern family and are most frequently found foraging outside the Bay and in the open ocean<sup>2</sup>. Accordingly, those contaminant levels may be quite unaffected by the proposed TMDL.

To our knowledge the only study of piscivorous birds that has unambiguously determined the source of mercury and other contaminants was conducted on the east coast and involved common terns. In this elegant study<sup>3</sup> the authors examined body feathers of birds during early incubation and then examined the re-grown feathers later in the season. In this way, the authors were able to determine whether the contaminants taken-up in the feathers were from a local source.

In the absence of these types of studies, it is in our view, inappropriate to suggest that the source of mercury contamination in the bird species in the Bay is known. Indeed, the report mistakenly suggests that clapper rails are sedentary species and their exposure to contaminants must be from a local source. While clapper rails are amongst the birds that typically do not migrate, they do however, have a post-breeding dispersal<sup>4</sup>. We know that clapper rails move around, as prospecting birds can be found exploring sites that may have been cleared from predators or were newly created following a habitat restoration project.

2. **The report fails to adequately consider the role played by other contaminants in the Bay and in other parts of a species' foraging area.** The report fails to consider the role played by other contaminants<sup>5</sup> (e.g., PCBs, for which there is also a Bay TMDL) that are known to exist at significant levels in sediment and fish tissue within the Bay and in other areas where the various species may forage. The mere presence of a contaminant does not necessarily mean that it was the source of impaired hatching or death. The absence of an understanding of the relative contribution of different contaminants to the various life cycles of a bird (or other wildlife) precludes the conclusion that any one of those contaminants was the cause of the impairment or death.

Given the acknowledged mix of contaminants within San Francisco Bay, the authors should have considered that the cause of allegedly decreased breeding success might be due to other factors, including other contaminants. Consequently, setting of bird target levels for mercury based on the presence of mercury in the eggs, ignores the contribution/threat from other contaminants and cannot support the expectation that attainment of the target will provide any benefit to a particular species or to wildlife in general.

3. **The TMDL report uses bird egg data for clapper rails that have been derived from an inappropriate study design and is biased in that it only includes non-hatched eggs.** We believe that the use of non-hatched eggs biases the sampling and fails to consider that other factors (contaminants) may have contributed to, or been responsible for, the failed hatching. Consequently, we consider the study design to be seriously flawed and insufficient to support any conclusive findings regarding its subject matter. Additionally, we believe that any TMDL planning and management that is based on the information obtained from the sample eggs is suspect and potentially seriously flawed and misleading.

We recognize that clapper rails are an endangered species and thus there is some sensitivity in collecting eggs for analysis from this species. However there are alternative, and in our view more appropriate, approaches to investigate the rail/mercury issue. Clapper rails lay a large clutch (often 8 eggs), and will lay more than once in a season<sup>4</sup>. Occasionally, they will lay three clutches. With this number of eggs being laid it seems unfortunate that egg data could not be collected from locations within the Bay where the confounding factor of predation – which is the ‘real threat’ to clapper rails -- has been minimized. Alternatively, or additionally, egg data from ecologically similar but non-threatened species could have been collected and provided some insight into the possible contamination levels.

In the absence of the studies we have outlined, we are unable to see how reliable data on clapper rail can be obtained and thereby serve as a basis for TMDL decisions and targets.

4. **The report fails to consider a ‘pathway approach’ to determine whether birds are exposed to mercury contamination, and whether that exposure leads to impairment or subsequent death.** Additionally, the report fails to adequately consider that there can be highly significant differences among species and indeed among individuals within a species, in terms of degree or frequency of exposure, and potential for impairment from exposure. The report relies on a mixture of largely unlinked or logically unrelated data and frequently assumed that mercury in some birds or in their prey correspondingly

means that the predators and/or other levels of the life are affected by the mercury. We believe that the apparent lack of a consistent and logical approach to identify potential contamination to birds is both ecologically and scientifically naïve.

The inconsistencies associated with the design, analysis and interpretation of the raw data and the seemingly poor understanding of the various species' ecology are highly likely to have led the report to erroneous conclusions. It would in our view thus be inappropriate to base any proposed TMDL activities or target levels on the existing information as presented.

5. **The report provides scant information on the feeding ecology of the species that are supposedly exposed to mercury.** The report has provided few data that unequivocally link the prey base of several species to subsequent toxicological effects. In the absence of data that describes how the prey-base may change both within and between seasons, it is not clear how the authors of the report are able to support any conclusion regarding the degree of exposure.
6. **The report inadequately describes the ability of most bird species to limit their exposure to contaminants.** The report fails to consider the physiological aspects of many bird species and their molt cycles and the effect this might have on the contaminant levels. Failure to consider the impact of such factors leads to incorrect assumptions about the likely load within particular species, as well the impact of any proposed implementation strategy on the health of the species.

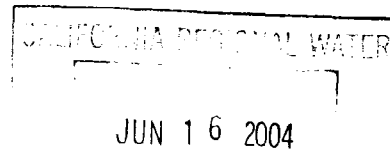
It is well known that most bird species undergo a pre- and post-breeding feather molt. Mercury taken up by birds is typically confined to certain feather tracts (usually the primary and secondary flight feathers)<sup>6,7</sup>. Thus when a bird molts its feathers, i.e., drops an old feather to enable a new feather to grow in its place, the mercury is lost<sup>6</sup>. Studies of terns and other seabirds have shown that they are constantly molting and that their primary and secondary flight feathers are being replaced year-round<sup>8</sup>. It has been shown that female birds will mate and pair with males that show they are constantly molting. This has been interpreted as a sign of a good quality male, as it takes a lot of energy to do this, (somewhat akin to a male peacock's tail). While the molting pattern of terns and other seabirds may be an adaptive strategy to attract mates, it is also in effect a very efficient method of minimizing contaminant load<sup>6,8</sup>. Given that both males and females are constantly molting it would suggest that adult terns and other seabirds are less likely to have a high mercury load.

**Respectfully submitted:**

**Adrian del Nevo, Ph.D**  
**Applied Ecological Solutions, Inc.**

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June 14, 2004

**Re: Comments On "Mercury in San Francisco Bay TMDL," Proposed Basin Plan Amendment and Staff Report (April 30, 2004).**

### **General Approach**

#### **Mass Budget Single Box Model**

It is not appropriate to use a single box model for such a complex hydrodynamic environment as San Francisco Bay to allocate loads. SF Bay may be characterized as two systems: a river delta-estuarine mixing zone in the North Bay (Suisun Bay, Carquinez Strait, and San Pablo Bay) and a tidally oscillating lagoon in the South Bay, with different sediment transport and mercury loads (Conomos, 1979). For example, in the TMDL Report, erosion of bed sediment in the North Bay and loads from the Central Valley comprise 900 kg/year or 74% of the total mercury input to the Bay.

While there is some exchange between the two systems, by treating the Bay as one system, the TMDL's analysis of and assumptions regarding of the assimilative capacity of the system and its response to loads, gives equal weight throughout the Bay to inputs to the North Bay that may only slightly affect the South Bay. Thus, it assumes loads from the North Bay are directly available to the ecology of the South Bay when in fact much of the sediment is released to the Pacific Ocean before it can be transported to the South Bay. A more realistic model of the Bay is needed both to set TMDL targets and to develop an effective implementation program.

#### **Assimilative Capacity and Linkage Analysis Not Adequate**

The TMDL Report assimilative capacity analysis is overly simplified and not adequate to justify expending large amounts of resources on removal of total mercury from discharges to the Bay. Background levels and site-specific properties in the Bay receiving water environment need to be taken into account using a realistic Bay Model when determining assimilative capacity and setting load allocations. Further, allocations should reflect achievable levels that account for the influence of historical activities, sources, the technical and economic feasibility of control, and the influence of downstream processes on production of methyl mercury.

#### **Estimated Loss through the Golden Gate**

The TMDL's estimate of mercury loss through the Golden Gate (the largest sediment and mercury sink) was developed by estimating inputs, assuming a mass balance in Bay sediment and assuming that the flux across the Golden Gate would be the difference between sources and the mass balance. The sediment flux was then multiplied by the average mercury concentration in suspended sediment for the entire Bay.

This approach is problematic for two reasons. The other sediment inputs are poorly known and understood. Accordingly, there can be little confidence in an estimate of sediment loss calculated by using the difference between those assumed inputs and the levels in the Bay.

In addition, the TMDL uses Bay-wide average suspended sediment mercury concentrations to represent the flux of sediment across the Golden Gate, although several of the Regional Monitoring Program stations are located in the Central Bay. The Report authors justify this by indicating, "sediment is assumed to come from all over the Bay." However, geochemical processes occur during sediment transport to the Golden Gate that may affect the concentration of mercury on the sediment. Therefore, a better method of obtaining an approximation of the volume of mercury moving through the Golden Gate would be to use mercury concentrations on suspended sediment near the Golden Gate.

#### **Sediment Discharges from Local Tributaries**

The report presents estimates of sediment discharges from local tributaries (urban and non-urban loads) based on data collected by the USGS from 1909 to 1966 (USGS 1980). These loads may not reflect the current loads of sediment discharging to the Bay due to changes in land use and percent imperviousness that have occurred in the Bay Area since the monitoring period 1906-1966.

In a recent study and publication (McKee, L., Leatherbarrow, J., Eads, R., and Freeman, L., 2004) staff from the San Francisco Estuary Institute (SFEI) and USGS collected detailed turbidity and suspended sediment and mercury data in the Guadalupe Watershed. The suspended sediment data indicated that since 1957-1962 (following completion of the reservoirs), the sediment concentrations in the Guadalupe River Watershed have decreased by approximately 15%. It is likely that changes in the sediment concentrations have been even greater in the period since the data collection period used to develop the sediment loads in the TMDL report (1906-1960).

#### **Mercury Discharges from Local Tributaries**

The TMDL Report developed estimates of mercury discharges from local watersheds by relying on samples of benthic sediment collected in local tributaries at the mouths and upland locations and multiplying the tributary sediment load estimates (USGS 1980) by the average concentration in benthic sediment collected from urban and non-urban locations. This calculation assumes that the concentration in the suspended sediment that is actually transported to the Bay is the same as in benthic sediment that was deposited in upland creek locations. The accuracy of this assumption is questionable and should be verified. In addition, if the urban sediment load estimated by USGS in 1980 is inflated in relation to that reflected in current conditions, due to urbanization, the urban tributary mercury load will also be inflated over actual values.

The TMDL report uses benthic sediment data collected between 1980 and 1989 to estimate the load of mercury from the Guadalupe watershed. Accordingly, sediment and mercury loads from the Guadalupe

watershed presented in the report would not reflect the results of remediation activities conducted in Almaden Quicksilver County Park in the late 1990's, which removed over 100,000 cubic yds of calcine deposits located along the waterways surrounding the Park. Even more recent sampling might not reflect those improvements, since sediment transport processes and reservoir operations can slow the delivery of sediment to the lower watershed stations where monitoring data are collected.

#### **Target for Mercury in Bay Suspended Sediment**

Control of total mercury in suspended sediment discharged to San Francisco Bay may not result in reductions in methylmercury concentrations in fish and prey in the Bay. Production and accumulation of methylmercury in the food chain through bacterial methylation and demethylation of mercury is a complex and poorly understood process that appears to be a function of several competing parameters. However, it is understood that bacterial methylation requires that mercury be soluble, i.e., pass through the cell membrane to be acted upon by intracellular enzymes (. If suspended sediment mercury is not soluble, then it cannot be bacterially methylated. Control of total mercury may not result in improvements to the Bay if the mercury removed is not bioavailable or not discharged to a methylating environment. In fact, remedial activities addressing reductions in total mercury loads, as contemplated by the proposed TMDL, could result in releases or dissolution of formerly sequestered mercury increasing the load of bioavailable mercury to the Bay. Thus, setting a suspended sediment target based on the assumption that mercury in suspended sediment is directly proportional to mercury in fish and bird eggs could result in misspent public resources if processes that control the production and accumulation of methylmercury are not taken into account in assessing the relative merit of implementation activities.

The reference that the TMDL Report provides as evidence of a direct relationship between suspended sediment total mercury and methylmercury concentrations in fish tissue does not support the hypothesis that control of total mercury in suspended sediment will result in decreases in methylmercury in fish tissue (USGS 2003). The USGS report indicates benthic sediment methylmercury concentrations are related to benthic sediment total mercury concentrations in the Everglades, when total mercury concentrations are less than 1 ppm. Suspended sediment in San Francisco Bay is in a much different biogeochemical environment than the benthic sediment in a wetland, which was the focus of the referenced study. Further, the USGS report does not provide evidence for the linkage between sediment methylmercury concentrations and mercury concentrations in fish tissues.

Respectfully submitted:

Terrence D. Cooke  
Senior Project Chemist  
URS Corporation

URS Corporation  
1333 Broadway  
Oakland, CA 94612

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Oakland, CA 94612



**Santa Clara Valley  
Urban Runoff  
Pollution Prevention Program**

Campbell · Cupertino · Los Altos · Los Altos Hills · Los Gatos · Milpitas · Monte Sereno · Mountain View · Palo Alto  
San Jose · Santa Clara · Saratoga · Sunnyvale · Santa Clara County · Santa Clara Valley Water District

June 14, 2004

Mr. Bill Johnson and Mr. Richard Looker  
California Regional Water Quality Control Board  
San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

**Re: Mercury in San Francisco Bay Total Maximum Daily Load (TMDL) Proposed  
Basin Plan Amendment and Staff Report**

Dear Mr. Looker and Mr. Johnson:

This letter is submitted on behalf of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) regarding the *Mercury in San Francisco Bay Total Maximum Daily Load (TMDL) Proposed Basin Plan Amendment (BPA) and Staff Report (Staff Report)*, dated April 30, 2004. The SCVURPPP would like to thank you for this opportunity to comment on the Report and commend each of you for your hard work.

Impairments to beneficial uses of water bodies in the San Francisco Bay Area are of utmost importance to the SCVURPPP. Furthermore, we agree that the reasonable protection of beneficial uses from controllable mercury sources in and to the Bay should be a high priority for all Bay Area public agencies and citizens. For the SCVURPPP, concern for elevated mercury concentrations in the San Francisco Bay biota have already caused us to refocus a portion of our public resources over the past few years towards reductions of mercury levels in urban runoff. We, as public agencies, take this task very seriously. Therefore, we believe a fair, objective and transparent TMDL and related BPA based on the best available information and sound science is important to its legitimacy, legality, and public confidence.

Over the past five years, the SCVURPPP and the Bay Area Stormwater Management Agencies Association (BASMAA) have attempted to collaborate with Regional Board staff on developing the mercury TMDL<sup>1</sup>. This collaborative approach is evident in SCVURPPP/BASMAA's active participation in the Mercury Watershed Council and more recently in the Clean Estuary Partnership (CEP).

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<sup>1</sup> During this process we have stressed the very important need to utilize a science-based TMDL addressing federal Clean Water Act requirements to inform development of a separate State implementation plan. This 2-step approach would maximize the Regional Board's ability itself to properly develop a risk management based implementation plan consistent with existing Basin Plan and State law requirements.

Unfortunately, the collaborative approach we have attempted to pursue does not yet appear to have been seriously embraced. For example, staff members representing SCVURPPP and BASMAA have attended numerous meetings (e.g., Mercury Watershed Council and CEP Technical Committee) with Regional Board staff and raised numerous issues and suggestions related to the TMDL. These issues, accompanied by constructive suggestions have also been raised to the Regional Board staff in comments concerning each of the following documents related to the Mercury TMDL (see Appendix A).

- Mercury TMDL Workplan-Workload (dated February 5, 1999);
- Watershed Management of Mercury in the San Francisco Bay Estuary: A TMDL Report to USEPA (dated June 30, 2000);
- Presentation of the Draft Mercury TMDL Project Report at the Mercury Watershed Council (October 31, 2002);
- Mercury in the San Francisco Bay Total Maximum Daily Load (TMDL) Project Report (dated June 6, 2003); and,
- Draft Mercury Basin Plan Amendment Language for Urban Runoff (dated September 2, 2003).

On the vast majority of the issues raised by SCVURPPP and BASMAA, a clear and meaningful response has not been given to date, either directly or by means of revisions to the Staff Report or BPA. We are cognizant of the fact that State resources are limited at this time; however responding to comments and concerns of stakeholders that will be directly affected by the proposed TMDL is an important task and there is little incentive or point to us engaging in stakeholder processes if our input is not going to be addressed.

Because the Regional Board staff has not addressed issues presented in comments previously submitted by the SCVURPPP and BASMAA, they remain largely unresolved. These include, but are not limited to:

- **The Linkage Between Mercury in Sediment and Methylmercury in Fish is Not Supported by Science** - The Staff Report focuses on reduction of mercury bound to sediment particles and makes the scientifically unsupportable assumption that this mercury is quantitatively linked to the amount of methylmercury that enters the aquatic food web. Unless the TMDL is substantially revised to focus (i.e., work on understanding how we could regulate based on methylmercury) on methylmercury, pursuing the current course will likely result in inefficient (and perhaps ineffective) control efforts and a related misallocations of resources.
- **Loads from Bed Erosion are Underestimated** – Recently available scientific information (USGS 2004) suggests that the loading estimate from the largest source of mercury to the Bay (i.e., bed erosion) is grossly underestimated (by 3x). Revising this loading estimate will paint a drastically different picture of the Bay's recovery, shortening it from roughly 120 years to 60 years. Not including this information in the TMDL will misinform the public and require larger than necessary, load reductions to be assigned to other source categories (i.e., urban stormwater runoff) which will consume scarce local government resources and not likely reduce mercury in the Bay.

- **Load Reductions from Urban Stormwater Runoff are Overestimated** - The load reduction proposed in the Staff Report and BPA for urban stormwater runoff is grossly overestimated and not grounded in sound science. A significantly large portion (> 75%) of the estimated total sediment load (410 M kg/yr) from urban stormwater runoff is actually attributable to sediment that has already been discharged to Bay Area surface waters. Recently collected data indicates that the mercury in this sediment is equal to the proposed sediment target (0.2 ppm) and, therefore, should require no or minimal load reduction. Not recalculating the urban stormwater runoff loading estimate will place an undue burden on municipal stormwater management programs and local government resources, and it will also misguide public perception as to the relative significance of this source.
- **A Significant Portion of Mercury in Urban Stormwater Runoff is Uncontrollable** - A significant portion of the estimated mercury load from urban stormwater runoff (i.e., in excess of 33%) is attributable to uncontrollable sources and should, therefore, be removed from this source category. As with nearly all mercury-related TMDLs that have been approved throughout the US, air deposition is a significant source and controlling it is beyond the jurisdiction and resource abilities of municipal stormwater management programs. The same is true of mercury loads emanating from Caltrans, which should be the subject of an independent allocation.
- **Technical Feasibility, Practicability and Costs** - The proposed requirements and Waste Load Allocation (WLA) for urban stormwater runoff are technically infeasible, go beyond the maximum extent practicable (MEP) standard and would place an undue burden on urban runoff management programs. It is questioned whether recycling programs, source controls and/or treatment controls designed to meet the proposed WLA are technically feasible to implement or are capable of meeting the load reduction targets even if feasible. Additionally, the estimated costs to the SCVURPPP (capital costs \$41 to \$50 million per year and reporting and maintenance costs of \$63 to \$78 million per year) greatly outweighs the benefit of reducing an estimated 7% (revised for bed erosion) of the source.

These unresolved issues are further discussed in Attachment "A". As you know, the proposed BPA has many new proposed requirements that the SCVURPPP may be required to address. From our estimates, we can foresee that many of these requirements will be technically infeasible, extremely costly, and will divert resources and priorities from other important stormwater management efforts. Considering this, suggested improvements contained within this comment letter need to be seriously considered and, we hope, incorporated into a revised BPA and Staff Report. (We believe that not doing so will most definitely place an undue burden on public agencies in the Bay Area by requiring burdensome implementation actions that will likely have no effect on mercury in the Bay and its biota.)

The Regional Board must also consider the economic impacts of any Mercury TMDL-related amendments to the Basin Plan, as well as the impacts that any amendment would have on the development of housing in the region. (See Water Code § 13241.) Unfortunately, the SCVURPPP member agencies will be required to implement requirements under severe budget restrictions, which have in many cases caused these agencies to cut back on important municipal services. In addition, Proposition 218 has added further restrictions on the ability of local government to generate additional revenues for urban stormwater programs. Thus, as required by the Water Code and the Basin Plan, it is particularly important for the Regional Board to recognize financial constraints on local agencies and to provide flexibility to ensure that


water quality objectives and implementation measures are economically attainable and technically feasible. (This is particularly true given long standing Regional Board policies concerning the South Bay.)

We recommend that the Regional Board postpone consideration of the BPA at this time and instead direct the staff to work with Bay Area stakeholders to substantially revise the Staff Report and BPA, including incorporating a phased implementation approach, similar to that used in the Cache Creek, Bear Creek, and Harley Gulch TMDL for Mercury (CVRWQCB 2004). The approach can be divided into a two-phase process. Phase I may include conducting studies to better determine sources, controllability, and cost effectiveness. During Phase 1, existing NPDES permit requirements, including the mercury reduction plan requirements in municipal stormwater permits would continue to result in enhanced control measures and reduction of mercury discharges. Once adequate information has been developed by a collaborative stakeholder process, Phase II would include the development of additional implementation plans to further reduce mercury based on new information collected during Phase I. Without the phased approach, actions to address scientifically flawed allocations and load reduction targets will likely provide little if any benefits to the Bay and its beneficial uses at significant (and unjustified) public expense.

Additionally, the SCVURPPP is in support and incorporates by reference the comments submitted by its legal counsel, BASMAA, the Santa Clara Valley Water District (SCVWD), the City of San Jose, the City of Sunnyvale, the County of Santa Clara, and its other members.

Please contact Mr. Chris Sommers or me at (510) 832-2852 if you have any questions regarding the comments or suggested changes.

Sincerely,



Adam W. Olivieri, Dr.PH, P.E.  
SCVURPPP Program Manager

CC: Bruce Wolfe  
Tom Mumley  
Dorothy Dickie  
SCVURPPP Management Committee  
SCVURPPP Legal Steering Group  
Donald P. Freitas, BASMAA Executive Board Chair

**“Attachment A”**  
**Unresolved Technical Issues with the Mercury TMDL**  
***June 14, 2004***

**Issue #1: The Linkage Between Mercury in Sediment and Methylmercury in Fish is Not Supported by Science**

The Staff Report bases its wasteload allocations on the inappropriate assumption that the relationship between total mercury measured in bedded or suspended sediments and methylmercury measured in fish tissue in the Bay is linear<sup>1</sup>. As described in comments submitted by Exponent Corporation on behalf of the Santa Clara Valley Water District, science does not support this assumption<sup>2</sup>. Unless the TMDL is substantially revised to focus (i.e., work on understanding how we could regulate based on methylmercury) on methylmercury, continuing to pursue the current course will likely result in inefficient (and perhaps ineffective) control efforts and a related misallocation of scarce public resources. (In other words, we will spend a lot of time and resources trying to remove and control a lot of dirt instead of targeting the actual pollutant of concern.)

The concentration of mercury in fish tissue depends on the nature and efficiency of a number of biogeochemical processes that vary between and/or within estuarine ecosystems. These processes include: 1) the solubilization of sediment-bound mercury into porewater; 2) the transformation of dissolved mercury to methylmercury; and, 3) the structure of the food web. The authors of the report state, “Factors relating to mercury methylation and accumulation within the food web are complex and not fully understood”. However, “In the absence of additional information, reductions in mercury loads are assumed, for the purposes of this report, to result in proportional reductions in fish tissue residues (pg. 48).”

While undoubtedly complex, enough is understood about mercury methylation to support further investigation to understand how we could regulate based on methylmercury (as the Central Valley Regional Board, the Santa Clara Valley Water District and USEPA are doing). The complexity of methylmercury formation is certainly not an excuse sufficient to justify a TMDL based on what science has clearly established is an unsupportable assumption between sediment-bound mercury and fish tissue.

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<sup>1</sup> To the extent that the proposed numeric targets and WLA are based on these assumptions they need to address the numeric standard /objective for mercury in South San Francisco Bay contained in US EPA's California Toxic Rule (CTR). The US EPA numeric standard/objective for mercury contained in the CTR incorporates a fish bioconcentration factor, and thus, was specifically developed by EPA to protect human health associated with the consumption of water and organisms.

<sup>2</sup> The discussion in the comments from Exponent regarding "new" and "old" mercury requires some clarification here. In the context of their comments, Exponent's referral to "old" mercury is applied to mercury in sediment, whereas "new" mercury is dissolved or methylated mercury in the water column, or mercury from atmospheric deposition.

## Issue #2      The Mercury Load from Bay Bed Erosion (as presented in the Staff Report) is Substantially Underestimated

The SCVURPPP agrees with the Staff Report that bed erosion is likely the largest source of total mercury to the Bay, given past resource management history (i.e., mining) and the likelihood of bed sediments continuing to erode. Therefore, we believe providing the best estimate of bed erosion for the entire Bay is of utmost importance when determining sources of mercury. Unfortunately the Staff Report does not attempt to include bed erosion from segments other than San Pablo and Suisun Bays, as requested in BASMAA's prior comments on the TMDL Project Report (see Appendix A). Regional Board staff responded to this request (dated August 25, 2003) with the following statement:

*"The desired information is unavailable. We do not intend to speculate in areas where we have no information. This information is being developed, however. Unfortunately, it won't be available in time for the Basin Plan Amendment. Thus we intend to rely on adaptive implementation to incorporate this information when it becomes available".*

But such information is available and must be considered before adoption of the BPA. The information is contained in a recently published USGS open file report (USGS 2004) (see Appendix B). In fact, this information was included in the recently published *2004 Pulse of the Estuary* (SFEI 2004). This new information indicates that the largest source of mercury to the Bay has likely been grossly underestimated in the Staff Report, having great consequence on estimated recovery times and necessary load reductions assigned to other sources. In light of the new available information, the SCVURPPP has developed and provided revised estimates of mercury loads attributable to bed erosion in the Bay. These estimates are summarized in Table 1.

**Table 1. Revised Estimates of Mercury Loads Attributable to Bed Erosion**

Bed Erosion Estimates	Mercury Load (kg/yr)	Sediment Load (M kg/yr)	Mercury Concentration (mg/kg)
<i>Suisun and San Pablo Bay Bed Erosion (TMDL Estimate)</i>	460	1,100	0.42
<i>South Bay Bed Erosion (USGS Estimate)</i>	920	2,200	0.42
<b>Total Bed Erosion (Suisun, San Pablo and South Bay Estimates)</b>	<b>1,380</b>	<b>3,300</b>	-
<i>Percent Increase from TMDL Estimate</i>	300%	300%	-

Including this information into the approach used by Regional Board staff to estimate overall sources and losses suggests that substantially more mercury is attributable to bed erosion than originally calculated. The revised source and loss numbers that include estimates of mercury from bed erosion in the South Bay are presented in Table 2.

As illustrated, the percentage of mercury coming from urban stormwater runoff pales in comparison to that coming from bed erosion. In fact, including bed erosion estimates from the South Bay into the single-box model used to develop the recovery curves presented in the Staff Report (which we do not agree is necessarily a representative and appropriate model) indicates that Bay sediment would likely meet the proposed sediment target (0.2 ppm) in a much shorter time-frame (~57 vs. 120 years), even without load reductions.

Furthermore, if bed erosion is properly accounted for including revised load reductions for urban runoff (see Issue #3) would only speed up recovery by a mere two years. This would suggest that costly management actions from urban stormwater runoff would not be justifiable as they likely have little effect on the recovery of the Bay, when compared to bed erosion.

**Table 2. Revised Estimates of Mercury Loads from Bed Erosion, Urban Runoff and Other Sources.**

	<b>TMDL Mercury Load (kg/yr)</b>	<b>% of Total Load</b>	<b>Revised Mercury Load (kg/yr)<sup>3</sup></b>	<b>% of Total Load</b>
<b><u>Sources</u></b>				
<i>Bed Erosion</i>	460	38%	1,380	64%
<i>Urban Stormwater Runoff</i>	160	13%	42	2%
<i>Other Sources<sup>4</sup></i>	600	49%	726	34%
<b><i>Total</i></b>	<b>1,220</b>	<b>100%</b>	<b>2,148</b>	<b>100%</b>

Therefore, the source assessment section of the Staff Report and BPA should be revised, prior to adoption by the Regional Board to include the new information on bed erosion developed by the USGS.

### **Issue #3: The Load Reduction proposed for Urban runoff is Grossly Overestimated and Not Grounded in Science**

As raised in previously submitted comments (see Appendix A), the loading estimate presented in the Staff Report and BPA attributed to urban stormwater runoff is highly uncertain and the methodology used to derive the estimate is seriously flawed. As stated in the Staff Report and BPA, the total mercury load from urban runoff is erroneously calculated at roughly 160 kg/yr (and non-urban runoff is 25 kg/yr). However, these estimates were developed on the basis of sediment loads and mercury concentrations in bedded sediment and the San Francisco Estuary Institute (SFEI) has recently commented that it is not possible to determine the bias and error

<sup>3</sup> Revised loading estimates include South Bay bed erosion and revised urban and non-urban stormwater runoff loading estimates (further described in Issue #3).

<sup>4</sup> Other sources include Central Valley Watershed; Guadalupe River Watershed; Direct Atmospheric Deposition; Non-Urban Stormwater Runoff; channel bed and bank erosion; and, Wastewater.

associated with loading estimates based on bedded sediment concentrations (McKee et. al 2003).

### ***Instream vs. Land-based Sources***

The estimated total sediment load from urban (410 M kg/yr) and non-urban (400 M kg/yr) areas has been incorrectly assigned in the Staff Report to urban and non-urban source categories. The scientific literature instead suggests that a large majority (>50%) of the estimated sediment load from Bay Area tributaries is attributable to “instream and hillslope erosional processes”, such as landslides and channel bank/bed erosion (Anderson 1981; Lehre 1981; Leopold 1994; Collins 2001; Stillwater Science 2002). This information is summarized in a recent literature review on urban runoff processes in the San Francisco Bay Area (McKee et al. 2003). Furthermore, the average concentration of total mercury in these “instream and hillslope” sediments is roughly equal to the proposed sediment target (0.2 mg/kg), and therefore, they should not require a load reduction via the TMDL. Empirical sediment data collected from bedded sediments in Bay Area urban creeks supports this assertion (see Appendix B).

To assist the Regional Board staff in properly assigning mercury wasteload and load allocations to relevant source categories, new preliminary loading estimates were developed for urban and non-urban stormwater runoff (using the same methodology used in the Staff Report and BPA) and channel bed/bank erosion (i.e., instream and hillslope sources). Using the estimated total annual sediment load from small tributaries (810 M kg/yr); loading estimates of total suspended solid (TSS) from urban and non-urban stormwater runoff<sup>5</sup>; and average total mercury concentrations from urban stormwater runoff (0.46 mg/kg), non-urban stormwater runoff (0.06 mg/kg) and channel bank/bed erosion (0.21 mg/kg) developed during the *Joint Stormwater Agency Project to Study Urban Sources of PCBs, Mercury and Organochlorine Pesticides* (KLI and EOA 2002), and the *Initial Characterization of PCB, Mercury and PAH Contamination in Drainages of Western Alameda County* (Gunther et. al 2001) new preliminary loading estimates were developed (Table 3).

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<sup>5</sup>Although it is expected that there will be variations in particle size distribution of sediment from urban runoff, recent studies have shown that sediment from urban stormwater runoff is made up of predominantly (90-100%) fine particles that are included in total suspended solid (TSS) measurements (USEPA 1983; Driscoll 1986; Ball et al. 1995; and Wisconsin DNR 1997).

**Table 3. Revised mercury loading estimates from urban runoff, non-urban runoff and channel bank/bed erosion**

	Estimated Sediment Loads (M kg/yr)		Estimated Hg Concentrations (mg/kg)		Estimated Hg Load (kg/yr)	
	<i>Hg TMDL</i>	<i>Revised</i>	<i>Hg TMDL</i>	<i>Revised</i>	<i>Hg TMDL</i>	<i>Revised</i>
Urban Runoff	410	91a	0.38	0.46b	160	42d
Non-Urban Runoff	400	86a	0.06	0.06	25	5d
Channel Bed and Bank Erosion*	-	633	-	0.21c	-	146
<b>Total</b>	<b>810</b>	<b>810</b>	<b>-</b>	<b>-</b>	<b>185</b>	<b>193</b>
<p>* Includes instream sediment storage, bed and bank erosion, gully and landslides</p> <p>a - Sediment loads are based on estimates presented in KLI and EOA (2002) <i>Joint Stormwater Agency Project to Study Urban Sources of PCBs, Mercury and Organochlorine Pesticides</i>.</p> <p>b – Estimated mercury concentrations are derived from sediment collected in Bay Area storm drain facilities (KLI and EOA 2002)</p> <p>c – Estimated mercury concentrations are derived from sediment collected in Bay Area creeks and open channels (KLI and EOA 2002; Gunther et. al 2001)</p> <p>d – These estimates include mercury attributable to indirect air deposition, which should be removed from the urban and non-urban stormwater runoff source categories (see Issue #3).</p>						

The SCVURPPP requests that the Staff Report and BPA be revised to reflect the above analysis and results shown in Table 3. We also request that mercury and sediment from channel bed and bank erosion instead be assigned a separate load allocation (LA) attributed to non-point sources. This is consistent with USEPA Region 9 *Guidance for Developing TMDLs in California* (2000), which states "...load allocations may be expressed...by pollutant discharge process (e.g., landslides)". (Due to the average concentration of total mercury in creek bed sediment being equal to the sediment target, the LA for this source should be equal to the current loading estimate. In other words, significant public resources should not be required to address the channel bed/bank source category under this approach.)

**Issue #4: A Significant Portion of the Estimated Urban Stormwater Load is Attributable to Uncontrollable Sources and Should be Removed from the Urban Runoff Load Estimate and Waste-Load Allocation (WLA)**

Indirect air deposition of mercury to San Francisco Bay Area watershed is not a controllable water quality factor and should be removed from the urban stormwater runoff load estimate. The Staff Report includes estimates of dry and wet deposition of mercury directly deposited onto the Bay but recognizes that these cannot be controlled or the associated loading reduced. However, estimates of the same indirect deposition onto the watershed adjacent to the Bay are treated exactly to the contrary, assumed to be 100% controllable, and included in the stormwater load estimates.

The sources of mercury in atmospheric deposition and their relevant contributions are not well understood, but likely include global background sources (e.g., imports from Asia). These sources are not “reasonably controlled” or likely to be reduced in the near future, and, therefore, should be considered uncontrollable water quality factors that lie outside of the Basin Plan’s narrative water quality objective for bio-accumulative substances. Further, these sources are outside the jurisdiction of the municipal urban runoff management programs. (Alternatively, if the staff believes that this source is controllable, they should explain why, the extent to which controllability applies, and estimate the likely costs and impacts of the control mechanism they identify.)

**Issue #5      The Proposed Implementation Plan for Urban Stormwater Runoff is Technically Infeasible, goes Beyond the Maximum Extent Practicable (MEP) standard, and would place an Undue Burden on Local Governments**

The Staff Report and BPA propose a 50% (78 kg/yr) reduction in mercury from Bay Area urban stormwater runoff, 21 kg/yr of which will be allocated to the SCVURPPP. (This allocation is exclusive of its members contributions to a 98% (90 kg/yr) reduction targeted for the Guadalupe River Watershed.)

***Technical Feasibility and Costs of Meeting the Proposed Wasteload Allocation (WLA)***

With regard to reducing the mass of mercury entering the Bay, as long as sediment continues to be the focus of this TMDL, urban runoff management programs will likely be called on to use one or more control and/or treatment options described below. However, as demonstrated, the focus on trying to control dirt is a recipe for failure as the implementation and success of many of these options is likely limited due to technical infeasibility and extremely high capital costs and ongoing implementation costs (see Table 4).

A summary of each possible control option, its technical feasibility, likelihood of success, and anticipated costs are briefly described below.

- Recycling Programs – includes developing recycling programs, operating recycling facilities and promoting the recycling mercury containing devices such as fluorescent light bulbs, thermometers and mercury switches.
- Source Controls – includes developing programs that remove sediment (and thus mercury) from municipal storm drain facilities and creek channels.
- Treatment Controls – includes developing and implementing mechanisms that capture and treat stormwater through the removal of fine sediment.

**Recycling Programs**

Estimates developed by SCVURPPP indicate that currently in the Bay Area, between 11 and 30 kg/yr of mercury in the Bay Area is recycled annually from fluorescent light bulbs<sup>6</sup> (ALMR 2003). However, as shown in previous studies, only a portion of this mercury (1-20% or 0.1 to 6 kg/yr)

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<sup>6</sup> Estimates are based on the following assumptions: 1) 2,892,000 bulbs recycled annually in the Bay Area by businesses and households combined (ALMR 2003) and, 2) 4 to 10 mg of mercury per light bulb (ALMR 2003; NEMA 2000).

may actually be released into the environment (but not necessarily reaching a water body) through volatilization<sup>7</sup> (USEPA 1994; NEMA 2000; Aucott et al. 2003). To determine the extent to which recycling fluorescent light bulbs could aid urban runoff management programs in meeting the proposed load reduction (78 kg/yr), the SCVURPPP has estimated that if every fluorescent light bulb purchased in the Bay Area were recycled, the load of mercury that would be avoided from entering the environment is between 0.5 and 24 kg/yr<sup>8</sup> (ALMR 2003). In other words, not taking into account technical feasibility or costs, only between 1-26% of the mercury load reduction required from urban stormwater runoff could be accounted for through fluorescent light bulb recycling.

Costs estimates associated with increased recycling of fluorescent light bulbs and other mercury containing devices (e.g., thermostats and switches) have been recently developed by SCVURPPP Co-permittees (i.e., Santa Clara County and City of Palo Alto). Infrastructure and operating costs of handling increased quantities of these devices by Santa Clara County's Household Hazardous Waste (HHW) Program could exceed \$10 million per year (D'Arcy 2002). Additionally, the City of Palo Alto (2003) has estimated that the average cost of recycling each fluorescent light bulb is approximately \$0.51. Therefore, based on these cost estimates and the estimated number of fluorescent light bulbs that are purchased/disposed of by households in Santa Clara County each year (~495,000), the total cost for the SCVURPPP would be significant (>\$10 million annually). These costs do not take into account the technical feasibility of collecting, shipping and recycling these wastes, do not include the costs of tracking and reporting recycling activities conducted by businesses (i.e., large waste generators), and do not take into account the costs associated with marketing and/or enforcement of a 100% recycling effort..

#### Source Control Program.

The SCVURPPP has spent a significant amount of resources and staff time in recent years on developing and implementing a Mercury Pollution Prevention Plan (Mercury Plan). However, it is not clear under the implementation plan whether (or how much) credit will be received for these activities. The Mercury Plan addresses five general goals:

- Elimination of all unnecessary municipal use of mercury-containing products and establishing proper disposal methods for products that cannot be eliminated.
- Providing mercury-containing product disposal services through household hazardous waste (HHW) collection programs for residents and small businesses, and encouraging the use of these programs.
- Participation in coordinated monitoring efforts to support mercury TMDL development and implementation, including assessment of air pollution sources of mercury and concentrations of mercury in sediment.
- Actively participating in regional, state and federal coordination efforts to achieve a reduction in the amount of mercury in urban runoff and air emissions.

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<sup>7</sup> Estimated 1 to 20% mercury volatilization rate.

<sup>8</sup> Estimates are based on the following assumptions: 1) 12,000,000 bulbs purchased/disposed of annually in the Bay Area by businesses and households combined (ALMR 2003); 2) 4 to 10 mg of mercury per light bulb (ALMR 2003; NEMA 2000); and, 3) 1-20% mercury volatilization rate (USEPA 1994; NEMA 2000; Aucott et al. 2003)

- Increasing awareness of proper disposal of mercury-containing products and available non-mercury containing alternatives (SCVURPPP 2003).

The Program has estimated costs for refining and implementing the Mercury Plan. These costs include:

- Further Plan Development and Outreach - Direct costs to the SCVURPPP to set up the mercury pollution prevention program and perform the initial outreach was \$25,000. Indirect costs to the SCVURPPP co-permittees to set up the program was approximately \$120,000.
- Implementation of Plan - This step involves development of policies, guidelines, and model ordinances. The SCVURPPP has allotted \$60,000 as the direct cost for program implementation. Additionally, indirect costs are incurred by co-permittees through the use of their own staff time. The SCVURPPP estimates that the implementation of the pollution prevention program costs SCVURPPP co-permittees \$120,000 initially and will cost an additional \$240,000 annually.

Therefore, the estimated total costs of developing and implementing SCVURPPP's Mercury Plan is roughly \$265,000 for development (i.e., annualized to \$19,000 per year) and \$300,000 annually to implement. (These estimates include costs for both the area-wide program and each of the co-permittee's individual programs.)

#### *Additional Source Controls*

Given the relatively low mass of mercury that can be removed via recycling programs and the extremely high costs associated with implementing these programs, it is likely that the SCVURPPP will be required to increase the extent of source control activities to meet the proposed WLA. Additional source controls (with regard to mercury) are those activities that involve the removal of sediment (and therefore mercury) during storm drain facility and creek/channel maintenance, and street sweeping. (All SCVURPPP co-permittees currently implement source controls as part of their urban runoff management programs. However, as currently structured, the WLA and implementation plan will provide no credit for these activities even though they reduce mercury. Increasing the magnitude of these activities is not feasible given the state of local government budgets; nor, would it be likely to meet the WLA.

In an attempt to further examine the feasibility and costs associated with additional source control, we have developed preliminary estimates of the mass of sediment that would have to be removed via source controls to meet the proposed WLA for urban stormwater runoff (Bay-wide). Opportunities for additional source control were focused on controls (i.e., storm drain facility and channel/creek maintenance) that have been shown in recent studies to have the greatest potential for removal of an additional mass of mercury (Salop et al. 2004). Based on available information, we estimate that in order to meet the proposed WLA for urban stormwater runoff (82 kg/yr), BASMAA member agencies would have to remove an additional 200 million kilograms of sediment per year from storm drain facilities and/or creeks/channels<sup>9</sup>.

However, as noted in Issue #3 of this comment letter, as the estimated average concentration of mercury in creek/channel bedded sediments is equal to the proposed sediment target (0.2ppm),

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<sup>9</sup> Estimate is based on a 49% decrease in the estimated 410 M kg/yr sediment load that contains an average mercury concentration of 0.38 mg/kg (ppm)

removal of these sediments will not substantially aid the recovery of the Bay. Taking this into account, we developed estimates of the mass and volume of material that would theoretically have to be removed from municipal storm drain facilities to meet the proposed WLA. Since only a portion (~25%) of the material typically removed from storm drain facilities is actually sediment, it is estimated that BASMAA member agencies would actually have to remove and dispose of an additional 800 million kilograms of material<sup>10</sup> annually from storm drain facilities. This mass of material equates to 1.4 million yd<sup>3</sup> or 47,000 30-yd<sup>3</sup> truck loads of material annually<sup>11</sup>. This is roughly a 500% increase from current storm drain maintenance activities. The technical feasibility of removing this volume of material annually from the municipal storm drain facility is highly questionable considering that this volume of material probably does not exist. (Preliminary estimates indicate that only an estimated 400 million kilograms of material may be entering the municipal storm drain system annually<sup>12</sup>.)

The costs associated with removing, hauling and disposing of this material is also prohibitive. Preliminary estimated costs for the SCVURPPP to conduct additional source control activities in response to the mercury TMDL are estimated to be approximately \$15 million in capital costs (i.e., annualized to \$1.1 million per year) and \$25 million in annual operating costs<sup>13</sup>. Removal, hauling and disposal of this volume of material would also likely entail several adverse environmental impacts.

### Treatment Controls

Stormwater treatment controls are methods of treatment to reduce pollutants from stormwater. Treatment methods typically include the infiltration, retention or filtering of stormwater. The assumption that new and redevelopment requirements (i.e., C.3.) will offset future increases in mercury from the increased population is unrealistic and unsubstantiated. A large majority of Bay Area cities are promoting smart growth, which encourages people to live in metropolitan hubs and urbanized areas where impervious surfaces are already present. As the Regional Board itself has previously recognized, C.3 requirements appropriately should not apply to such urbanized and high developed areas as they would otherwise create incentives for sprawl.

As noted in many previous studies, reports and guidance manuals, most treatment controls are extremely inefficient at removing fine sediment (and therefore mercury) and require ongoing maintenance (Metropolitan Council 2001; VCSQMP 2002 ; CASQA 2003). Those treatment controls that have shown efficiency in removing fine sediment are typically large in size (> 1 acre), due to the relatively long residence time needed to allow fine/suspended sediment to be removed from the water column through settling. Other treatment controls will likely require the construction of additional infrastructure (e.g., a capital intensive stormwater treatment plant). The technical feasibility and estimated costs of constructing, operating and maintaining these treatment controls are described below.

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<sup>10</sup> The estimate is based the assumption that the 400 million kilograms is split between organic material (300 million kilograms) representing 75% of the total and sediment (100 million kilograms) representing 25% of the total. The revised total mass of material of 800 million kilograms of material is based on the updated mass of sediment to be removed of 200 million kilograms and the proportional increase in the total mass of material based on the 75% to 25% split between organic and sediment material.

<sup>11</sup> Estimate is based on a sediment mass to volume conversion factor of 570 kg per yd<sup>3</sup>

<sup>12</sup> Estimate is based on 91 kg/yr of annual TSS loading from urban areas (KLI and EOA 2002) and assuming that roughly 25% of the material in storm drain facilities is sediment (Salop et al. 2004).

<sup>13</sup> These costs are based on purchasing, operating and maintaining vector trucks; constructing and operating storage facilities; hauling; staffing; and, waste disposal in a municipal landfill.

### *Treatment Control Measures*

Structural treatment control measures treat incoming stormwater by settling and usually hold water for at least 24-72 hours. These design standards for maximum pollutant removal efficiency indicate that a large area (>1 acre) is needed if construction is to occur. Therefore, the implementation of treatment controls such as wet ponds, and detention and infiltration basins is technically *infeasible* in most urbanized areas of the Bay, due to the lack of undeveloped land area on which such facilities would need to be constructed.

Costs of constructing and maintaining treatment controls vary. Without considering the costs of purchasing land needed to construct treatment controls, Minton (2003) estimates that the cost of constructing a wet pond can range between \$1,600 and \$9,000 per acre of development. Additionally, it is likely that land costs in the urbanized areas in Santa Clara County will exceed \$1 million per acre. Although little information was available to estimate operation and maintenance costs, they are believed to be substantial, ongoing, and likely much higher than construction costs.

### *Stormwater Treatment Plant*

The technical feasibility and costs associated with the construction of new stormwater treatment facilities, or the retrofitting of existing wastewater treatment facility infrastructure can vary greatly, and are highly dependent on site specific characteristics (e.g., proximity of storm drain lines to sanitary sewer lines and the capacity of the existing sanitary sewer lines), the availability of land to construct new facilities, existing plant capacity, and the volume and flow of stormwater that is intended for treatment. This analysis is further complicated since mercury in urban runoff is primarily associated with suspended sediments and the suspended sediments concentrations are typically elevated during early season rains and first flush events. In addition, the connection of urban runoff flows to wastewater treatment plants is unconventional since most plants have been designed to exclude runoff and any excess capacity is earmarked for future growth.

Therefore, based on currently available information, it appears highly unlikely that stormwater could feasibly be diverted to existing treatment plants in the South Bay, without substantial retrofits to the treatment plant infrastructure. These retrofits would include, at a minimum, increasing plant capacity and constructing new sanitary sewer lines. Preliminary costs estimates of implementing these retrofits for urban runoff flows in the South Bay (excluding land, additional piping, pumping costs, flow equalization/detention basins and recognizing the difficulties noted above including the assumption that urban runoff

can be separated from non urban runoff) are between \$67 million per year for primary treatment (i.e., \$37 million /year for O&M and \$30 million per year capital) and \$88 million per year (i.e., \$50 million per year for O&M and \$39 million per year for capital) for primary plus filtration<sup>14</sup>.

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<sup>14</sup> Preliminary cost estimates are based on treating the flow volume for urban runoff (Davis, J.A. 2000) estimated for Santa Clara at approximately 153,000 acre-ft/year and utilizing updated primary and primary+filtration unit costs for wastewater treatment (UC Davis, 1992). Flow estimates increase by approximately 30% per year if treatment of all runoff (i.e., urban and non urban) is necessary. Unit costs of \$100,000 per acre-ft./day for primary plus filtration and a unit cost of \$78,000 acre-ft/day for primary treatment were used. The unit treatment costs were escalated to 2004 dollars and annualized over a twenty year period (i.e., includes capital plus O&M). The annual cost for O&M is roughly 56% of the total. The annualized cost for capital is based on a 25 year term at 5% interest.

### Urban Stormwater Runoff Source Investigations

Initiating and implementing special studies to determine the spatial extent, magnitude, and locations of potential small sources of mercury in urban stormwater runoff can be an expensive, time consuming and unfruitful experience. Furthermore, the number of and extent of studies that will be required is currently unknown, but could include all sites where previous studies have determined that mercury concentrations in storm drains or creeks/channels exceeded the proposed 0.2 mg/kg sediment target (i.e., ~56 sites). Based on previous experience conducting PCB Case Studies, the estimated cost of each of these studies is between \$10,000 and \$100,000 annually, suggesting an annual cost between \$560,000 and \$5.6 million Bay-wide.

### Monitoring System

The proposed BPA includes a requirement for urban runoff management programs to develop and implement a monitoring system to quantify either mercury loads or the loads avoided through treatment, source control, and other management efforts. Although the scope and extent of the monitoring system is not fully understood, we anticipate that this requirement will include both ambient environmental monitoring and monitoring loads avoided/removed from recycling programs, source controls and treatment controls. It is estimated that environmental monitoring conducted solely for mercury will likely cost the SCVURPPP between \$100,000 and \$250,000 annually. Additionally, monitoring loads avoided/removed from implemented controls is estimated to cost roughly \$125,000 annually. Therefore, the total estimated cost for just the SCVURPPP to meet this requirement is between \$225,000 and \$375,000 annually.

### Fate, Transport, and Biological Uptake Investigations

The SCVURPPP assumes that this requirement can be satisfied by participating in the Regional Monitoring Program for Trace Substance (RMP) and/or the Clean Estuary Partnership at our current level of funding. If this assumption is correct, the estimated cost of complying with this requirement would be equal to current annual contribution to the RMP and CEP combined (~\$250,000), plus the costs of staff time (~\$50,000) needed to participate in and track these programs (i.e., total costs to SCVURPPP = ~\$300,000 annually). These costs do not include contributions to the RMP and CEP from Co-permittee owned and operated POTWs. Any additional studies requiring funding or staff time would substantially increase costs.

### Caltrans Allocation-Sharing Scheme

The implementation plan envisions urban runoff programs developing agreements with Caltrans to address a portion of the current urban runoff WLA/load reduction targets. However, developing WLAs for dischargers covered by other NPDES permits (which any agreement would effectively necessitate) is not the responsibility of municipal urban runoff management programs. BASMAA member agencies (including SCVURPPP) have no jurisdiction over and cannot control Caltrans activities. While we do not disagree that Caltrans should be addressed under this TMDL and BPA, we request that approach currently recommended by Staff be removed in favor of them identifying a separate WLA and load reduction target specifically for Caltrans.

### Annual Report Preparation

If the BPA is approved, then the Program will be required to prepare an annual report to measure progress towards achieving the WLA and documents either mercury loads or loads avoided through ongoing pollution prevention and control activities. While the above indicates that there is no reasonable prospect of addressing the BPA's unrealistic load reduction targets for urban runoff even with enormous public investment, we estimate that the development of specialized reporting forms documenting this likely outcome (and concurrently serving as a target for criticism and potential third party legal action) will cost roughly \$50,000 initially, while ongoing staff time needed to prepare annual reports will cost the SCVURPPP roughly \$100,000 annually. These estimates include costs for both the area-wide program and each of the co-permittee's individual programs.

### **Summary of Estimated Costs**

***Total estimated costs for SCVURPPP to address the proposed WLA and load reduction targets presented in the Staff Report and BPA are between \$41 to \$50 million per year for capital costs and between \$63 and \$ 78 million per year for ongoing costs (i.e., operation and maintenance, reporting, etc) for reducing an estimated 7% (revised for bed erosion) of the source (see Table 2). A summary of these costs is presented in the in Table 4.***

**Table 4. SCVURPPP's Estimated Costs of Complying with the Proposed WLA and Requirement for Urban Runoff Management Programs (b)**

<b>Control/Requirement</b>	<b>Annual Capital Costs(a)</b>	<b>Annual Ongoing Maintenance &amp; Reporting Costs</b>
Recycling Programs	\$ 10 Million	\$250,000
Source Controls	\$ 1.1 Million	\$ 25 Million
Treatment Controls		
<i>Treatment Control Measures</i>	Unknown	Unknown
<i>Treatment of South Bay Urban Runoff</i>	\$30 million per year (primary) to \$39 million per year (primary plus Filtration).	\$37 million per year (primary) to \$50 million per year (primary plus Filtration).
Source Investigations	-	\$150,000 to \$ 1.5 Million
Source Control Program	\$19,000	\$300,000
Monitoring System	-	\$225,000 to \$375,000
Fate/Trans/Uptake Studies	-	\$300,000
Allocation Scheme	Unknown	Unknown
Annual Reporting	\$4,000	\$100,000
<b>Total Costs (b)</b>	<b>\$41 million to \$50 million per year</b>	<b>\$63 million to \$78 million per year</b>

a. **Annual Capital** costs are annualized over a 25 year term at a 5% interest rate.

b. It may be possible to remove some or all of the Source Control costs for sediment removal and disposal depending on the flow and treatment assumptions utilized for modification and or building new facilities, however all costs are at this point in the analysis.

#### **Issue #5      The WLA for urban runoff does not factor in projected population growth in the Bay Area, which will most likely increase mercury loads in the future**

The population in the Bay Area is estimated to increase 14% by 2025 (ABAG 2004). Some mercury in urban stormwater runoff is believed to partially originate from local air sources (e.g., fluorescent bulb breakage<sup>15</sup>), which will likely increase with the increased population. The proposed wasteload allocation (WLA) for urban stormwater runoff does not factor in projected

<sup>15</sup> Note that uncertainty surrounding this assumption is large.

growth, as often is done in TMDLs. As suggested by Dr. Sedlak's peer review comments on the Staff Report and BPA, we suggest that the Regional Board staff address the issue of future increase of mercury concentrations entering the Bay via growth. Additionally, the WLA for urban stormwater runoff should be revised to include these inevitable increases.

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## **Appendix A**

Comments Previously Submitted by SCVURPPP and BASMAA  
on Mercury TMDL-related Documents

**Santa Clara  
Valley Urban  
Runoff Pollution  
Prevention Program**

November 15, 1999

Mr. Khalil Abu-Suba  
San Francisco Bay Region  
Regional Water Quality Control Board  
2101 Webster Street, Suite 500  
Oakland, CA 94612

Dear Mr. Abu-Suba,

On behalf of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) I would like to submit comments on the draft Mercury TMDL Workplan-Workload (February 5, 1999). These comments were also discussed at the May 19, 1999 Mercury Watershed Council TMDL Work Group Meeting.

The Mercury TMDL Workplan needs to clearly state the need for and define as tasks the following:

1. Develop a **TMDL schematic** (draft attached) that lays out TMDL steps and the relationship between steps as centerpiece for the Work plan.
2. Develop a bay-wide Mercury **Conceptual Model**. The conceptual model should build on the work already conducted by the RWQCB staff. The conceptual model needs to summarize the current understanding of mercury cycling for the entire bay; contain an estimate source loadings, provide an estimated mass balance; describe processes, importance and uncertainty; describe uptake and toxicity from both an ecological perspective and from a human perspective. The work on developing this conceptual model could be done in two phases: initial qualitative model and then a quantitative overlay (the quantitative model would be used to begin evaluating the impact from implementation of alternative potential source control efforts).
3. Develop a **mathematical model** based on very clear and specific research needs tied to addressing questions identified in the conceptual model (the purpose of this model would be to more accurately evaluate the relative effectiveness of alternative source control strategies).
4. Develop a clear plan to link **Sacramento and CalFED** work and resources with the needs for San Francisco Bay.

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□ 1410 Jackson Street • Oakland, CA 94612 • tel: (510) 832-2852 • fax: (510) 832-2856  
□ 505 W. Olive Avenue, Suite 635 • Sunnyvale, CA 94086 • tel: (408) 720-8811 fax: • (408) 720-8812

5. Develop a clear plan to link the **Regional Monitoring Program (RMP)** effort with the needs of the TMDL Workplan.
6. Develop a **detailed plan that identifies resource needs** required to address a specific scientific question (e.g., methylation) along with the real/potential source(s) of resources.

The SCVURPPP looks forward to continuing to participate in the Mercury Council and TMDL process. Please address any questions or comments to me.

Very truly yours,

*Originally signed by*

Adam W. Olivieri, Dr. P.H., P.E.  
Program Manager

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**Santa Clara Basin Watershed Management Initiative  
Bay Monitoring and Modeling Subgroup  
Technical Review of:**

**Watershed Management of Mercury**

**In the**

**San Francisco Estuary:**

**Draft Total Maximum Daily Load**

**Report to the U. S. EPA**

California Regional Water Quality Control Board

San Francisco Bay Region

May 9, 2000

**Prepared by Tetra Tech, Inc.  
June 19, 2000**

The *Watershed Management of Mercury Report* (Mercury Report) does a good job of summarizing existing information on measured mercury concentrations in fish and wildlife, sediment, and the water column. However, the existing information does not make a sufficiently strong case for the impairment of beneficial uses. Additional information is needed both to address the impairment issue and to develop more appropriate target concentrations in fish, sediment and the water column. This review focuses on the impairment issue and the adequacy of the suggested targets to regulate mercury sources given the existing understanding of background conditions.

**Mercury Concentrations in Fish and Beneficial Use Impairment**

The measurement of total mercury concentrations in fish muscle tissue is a good indicator of the occurrence of bioavailable mercury in a watershed. These measurements are relatively straightforward to make, and the results are therefore dependable. But most

importantly, mercury accumulates in fish tissue, and the mercury levels in the tissue provide a record of mercury exposure.

However, the fish data presented in Figure 5 of the report do not support the conclusion that the Bay is impaired by mercury. With the exception of one species (Leopard shark), fish mercury concentrations are below the FDA standard (1 mg/kg or  $\mu\text{g/g}$ ). The report also states that "half of the fish from San Francisco Bay that were analyzed for mercury showed concentration above the screening value of 0.23  $\mu\text{g/g}$ ". However, the 0.23  $\mu\text{g/g}$  value has no regulatory basis for determining impairment. The interpretation of these data should include a comparison of mercury concentrations found in other water bodies throughout the world. For example, the Agency for Toxic Substances and Disease Registry's Toxicological Profile (ATSDR, 2000) for mercury states:

"typical mercury concentrations in large carnivorous freshwater fish (e.g., pike) and large marine fish (e.g., swordfish, shark, and tuna) have been found to exceed 1  $\mu\text{g/g}$  ..... Methylmercury concentration in muscle tissue of 9 species of sharks were analyzed from 4 locations of Florida.... Muscle tissue methylmercury concentration averaged 0.88  $\mu\text{g/g}$  and ranged from 0.06 to 2.87  $\mu\text{g/g}$ , with 33.1 % of the samples exceeding the FDA action level (1 ppm)."

Sharks throughout the world have elevated concentrations of mercury, and they are not a good sentinel species to gauge the human health risks associated with fish ingestion in the San Francisco Bay watershed.

The mercury concentrations that were presented in the Mercury Report for the other species are not indicative of impaired conditions. The U.S. Environmental Protection Agency in their characterization of human health risks from mercury emission reported that average total mercury concentration in bass, crappie, halibut, mackerel, pike, snapper, and tuna range from 0.2 to 0.3  $\mu\text{g/g}$  (U.S. EPA, 1996). The mean total mercury concentration in muscle tissues of fish studied in the Azores, where there is no major industry and no significant discharge of mercury, was reported to be "generally low, ranging between 0.04 and 0.37 mg/kg" (Anderson and Depledge, 1997). In southern California, the mercury concentrations in Barred sand bass from the nearshore environment ranged from 0.10 to 0.27  $\mu\text{g/g}$  (Phillips et al, 1997). On the other hand, measurements made at a known contaminated site in Princess Royal Harbor, Australia provide a basis of comparison. The mean concentration of mercury was less than 0.5  $\mu\text{g/g}$  in only two of 18 fish species sampled (Francesconi and Lenanton, 1992).

The data presented in Figure 5 of the report provide valuable information on the levels of mercury in fish from San Francisco Bay. This information points to the need to better characterize fish mercury levels, but these data are not sufficient to support the conclusion that San Francisco Bay is an impaired water body.

## Background Conditions

It is necessary to develop a better understanding of background concentrations prior to promulgating new mercury criteria.

The data presented in Figure 18 do not support the conclusion that mercury concentrations of 0.05 to 0.1  $\mu\text{g/g}$  define the range for pre-anthropogenic mercury in sediments. The background concentration in San Pablo Bay is close to the proposed standard of 0.4  $\mu\text{g/g}$  even at a depth of 2.5 m. However, the analysis of the ability and likelihood to obtain a mercury concentration in the water column of 0.025  $\mu\text{g/l}$  (Table 8) is based on the assumption that the pre-anthropogenic mercury concentrations in the sediments were 0.05 to 0.1  $\mu\text{g/g}$ .

Most locations in the Bay have sediment concentrations below the 0.4  $\mu\text{g/g}$  target. The regions that have higher concentrations may have had naturally high concentrations given the widespread presence of mercury deposits. Both the north and south portions of the Bay receive runoff from areas with high mercury-content minerals. Background sediment concentrations in these segments of the Bay are likely higher. Additional data on sediment concentrations from dated, deep cores are necessary to better estimate background mercury levels. These background data are required to determine both the applicability and feasibility of any proposed water quality or sediment objectives.

## Proposed Target Mercury Concentrations

**Total Recoverable Mercury.** The description of the water quality standard (0.025  $\mu\text{g/l}$ ) as total recoverable mercury is misleading. Because the acid-digested ( $\text{HCl}$ ,  $\text{HNO}_3$ , and  $\text{HF}$ ), unfiltered mercury concentration is being measured, this measurement should be referred to as total mercury. Regardless, "recoverable" mercury does not equal "bioavailable" mercury. At a minimum, the RWQCB should consider treating dissolved and particulate-associated mercury separately. Most of the mercury entering natural waters is sequestered in unavailable forms and is buried in the sediments. Very little of it ever becomes bioavailable.

**Methylmercury Target.** As described in the Mercury Report, the methylmercury target in water (0.05  $\text{ng/l}$ ) is conservative and based on wildlife protection concerns. However, regarding the impairment issue, it is important to note that methyl mercury concentrations everywhere in the Bay are below the target 0.05  $\text{ng/l}$  (Table 30). As a point of reference,

it is interesting to note that the methylmercury target is less than methylmercury concentrations measured in rain at remote locations (0.16 ng/L).

**Sediment Mercury Target.** The target value for sediment mercury concentration is based on the relationship presented in Equation 2 (p. 67). However, the proposed target value does not vary as a function of the percent of fine materials. Rather, it is a fixed value that is calculated based on ten samples collected from the mouth of the Sacramento River. Given the importance of this number (0.4 µg/g) in deriving loads, it is appropriate to show the data used in the calculation and to discuss both the consequence of using different data to derive the target concentration and the relevance of using data from the mouth of the Sacramento River to represent Bay-wide conditions.

Additional analysis before setting a sediment target concentration is also important because of the large range in toxicity and bioavailability of the different forms of mercury. Treating all mercury as equivalent is not justified.

The importance of giving more careful consideration to the setting of a target sediment concentration is demonstrated using the example from the executive summary of the Mercury Report. In that example, it is pointed out, assuming mercury concentrations in the sediments of 1 µg/g, that the load allocation of the Guadalupe River watershed could be met by the removal of 45 million kilograms of sediment or enough sediment to fill 45 large trucks. However, the maximum payload limit of a 5-axle tractor-semitrailer on California highways (USDOT, 1997) is approximately 60,000 lbs (27,000 kg). Therefore, a better estimate of the number of truck loads required is 1,700 at a sediment concentration of 1 µg/g and 170 truck loads at 10 µg/g.

Although the original example in the Mercury Report is not a serious proposal and was obviously intended to provide some perspective to the scope of the load reduction requirements, it is indeed illuminating. It points to the fact that sediment removal on this scale to meet specified load reductions is impractical. Further, this example is instructive because it points out the benefit of considering the form of mercury when setting load allocations. The same benefit in terms of human health and ecological risk reduction could be achieved by the removal of just 1 kg of methylmercury versus the removal of tons of the mineral form of mercury (HgS, cinnabar).

## Summary

Table 1 summarizes the major concerns identified in this review. The principal concern is that the fish data presented in the Mercury Report are not sufficient to support the impairment conclusion. There is a need to develop information on mercury contamination in more species. Any additional data collection efforts also need to focus on a few indicator species and the collection of fish samples within comparable size

ranges. Finally, the screening value of 0.23 µg/g is near the expected background concentration of mercury in fish worldwide and is not a good measure of impairment.

Although the Basin Plan numeric objective for mercury in water (0.025 µg/l) is exceeded, this standard treats all forms of mercury the same regardless of toxicity or bioavailability. The use of this value as a primary indicator of impairment is inadequate.

Finally, the use of a value of 0.4 µg/g as a numeric target does not take into consideration either site-specific background conditions or the toxicity and bioavailability of the different forms of mercury.

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**TABLE 1. SUMMARY OF COMMENTS ON RWQCB PROPOSED MERCURY STANDARDS FOR SAN FRANCISCO BAY**

<b>Environmental Medium</b>	<b>RWQCB Suggested Objective</b>	<b>Basis</b>	<b>Concern</b>	<b>Suggestions</b>
<b>Water - Recoverable Mercury</b>	0.025 µg/l	U.S. EPA	Treats all forms of mercury the same regardless of toxicity or bioavailability.	Some forms of mercury are millions of times more toxic than others. "Recoverable" mercury does not equal "Bioavailable" mercury. As a minimum consider treating dissolved and particulate associated mercury separately. By far, most of the mercury entering natural waters is sequestered in unavailable forms and is buried in the sediments. Very little of, it ever, becomes bioavailable. If all of the mercury entering the SF Bay was converted to methylmercury, mercury concentrations in the fish would certainly not be just fractions of a part per million, as in fact they are.
<b>Fish</b>	0.23 mg/kg	SFEI	A part from sharks, fish in SF Bay have mercury concentrations less than both the U.S. FDA and United Nations limit. Impairment is thus questionable as is the need for such a low standard.	U.S. FDA standard is 1.0 mg/kg, UN World Health Organization standard is 0.5 mg/kg. Several states are now using the 0.5 standard, e.g. Colorado, Wisconsin, Arizona. Given the current minimal impairment, suggest 0.5 to 1.0 mg/kg as standard.
<b>Sediment</b>	0.4 mg/kg	Median Value for Sacramento River Sediment	South & North Bay receive runoff from areas with high mercury content minerals. Background concentrations in these segments of Bay are likely higher. Sacramento River receives runoff from most of N. California with some Hg hot spots, but with much dilution.	Use sediment concentrations from dated, deep cores to better estimate local background mercury levels.

**Load Allocations:** Given the large range in toxicity and bioavailability of the different forms of mercury, it is inappropriate to treat all mercury as equivalent. (The toxicity of methylmercury for example, is many fold more than that of mercury in mineral form). Also the proposed standards do not consider where mercury is discharged into the Bay. With these problems, and with the minimal endangerment, allocating mercury inputs to the hundredths of a kilogram is premature.

**Santa Clara Basin Watershed Management Initiative  
Bay Monitoring and Modeling and Regulatory Subgroup  
Meeting Notes  
June 26, 2000, 10 to 3 PM**

Attending: Dan Bruinsma (Co-chair City of San Jose), Tom Mumley (Co-chair RWQCB), Dave Tucker (San Jose), Trish Mulvey (CLEAN South Bay), Adam Olivieri (EOA), Kirk Willard (Lockheed), Phil Bobel (Palo Alto), Wil Bruhns (Chair RS, RWQCB), Tom Grieb (Tetrattech), Dave Drury (SCVWD), Kristy McCumby (City of Sunnyvale), Deborah Johnston (DFG), Michael Stanley-Jones (SVTC), Libby Lucas (LWV), Richard McMurtry (SVTC), Monica Oakley (LWA), Lorrie Gervin (City of Sunnyvale).

**Summary of June BMM/RS Meeting Notes:**

1. Review and Accept Minutes: The previous minutes were accepted (the minutes were distributed to Core Group at April meeting).
2. Review Action Items: A summary table of actions was distributed. All keys action items have been addressed and/or will be discussed as part of June meeting. It was agreed that updating the BMM Workplan would occur in the fall of 2000. Copies of the April and May BMM reports to the Core Group were distributed.
3. Continue Discussion on Draft POTW Permit Amendments: Discussion continued on the draft language developed by Wil Bruhns. Wil handed out an updated draft. He noted that the revised language: starts delisting process to remove copper and nickel from the 303d list, locks in future CAP/NAP actions, and adds SIP language. He noted that comments were received from Phil regarding Pollution Prevention language, and comments from the City of San Jose and Sunnyvale. The City of San Jose and Sunnyvale (CSJ/CS) handed out comments on the draft amendments which were discussed. The CSJ/Cs comments include request that separate amendments be issued (not a joint amendment), that finding 5 be explicit about which reports have been completed relative to compliance with the existing permit requirements, that finding 10 be edited to conclude no impairment and that delete the default, SIP language be added to finding 11, that the permit include language to recognize factors beyond the dischargers control may impact water quality and that these need to be taken into account relative to initiating CAP and NAP actions, and that the mass limits for copper and nickel be deleted.

Discussion on the above comments continued. Michael and Trish understand POTW request for controllable factors language, expressed concern about generic language and need for step in between trigger and action. Adam suggested using and/or referencing Basin Plan language contained in Chapter III regarding controllable factors issue. Trish asked about Table 4-2 language regarding addition of a finding to address "convening the powers to be."

Trish asked noted that it would be good if both sets (POTW and Stormwater) of permits were available for review together. Adam noted that we could add this to the August 9 Stormwater meeting, if time allows, to look over joint finding language.

**ACTION:** Wil will look at possible re-opener/step language regarding step between trigger being hit and action being taken. Adam will send out City of San Jose and Sunnyvale edits (e-mail) with a request that comments be sent to Wil by July 14. Revised language will be distributed at the end of July for discussion at the next meeting. Also noted that an additional meeting in August may be needed.

Phil raised some questions regarding who was conducting the CAP monitoring and where were the data going to be presented.

**ACTION: The City of San Jose will prepare an approach for how and when reporting of the monitoring data will be conducted.**

4. Discussed Technical Comments on RWQCB Bay-Wide Hg TMDL: Tom Grieb handed out draft technical comments prepared on behalf of the BMM for submission. He also handed out a summary table of the key comments (copies attached). Tom noted that Figure 5 in the RWQCB report does not support conclusion that Bay is impaired and that additional characterization to support this conclusion is required. Tom also noted that the data in Figure 18 do not support the proposed pre-anthropogenic concentration in sediments, that "recoverable" mercury does not equal "bioavailable" mercury, that the methyl-mercury target is conservative and less than what is being measured in rain at remote locations, that the largest single source of mercury (globally) are coal-fired power plants, and the sediment target is based on very limited data and additional data and analysis are required prior to selecting such a number. The BMM/RS discussed the comments and decided to transmit the comments to the RWQCB for consideration as part of developing the Mercury TMDL.

**ACTION: BMM/RS received technical comments and approved forwarding them to the RWQCB without endorsing the comments. Adam will transmit the comments to the RWQCB and include note in monthly status report. Adam will transmit comments to Guadalupe Mercury Work Group and WAS as information.**

5. Information on North Bay Impairment Assessment Work Effort: Tom Mumley briefed group on efforts underway in North Bay. Tom handed out North Bay draft summary of Work plan dated June 21, 2000 and RWQCB's June 21, 2000 letter supporting effort and workplan. Tom noted that South Bay efforts, especially relative to addressing uncertainty for copper should be coordinated with those in the North Bay. Michael asked to be put on North Bay mailing list. Deborah J. also wanted to be added to list. Tom noted that environmental groups would/should probably start getting involved sometime during late summer and that the RWQCB may act as host for the stakeholder group.
6. Status of CAP:
  - a) Phytoplankton Toxicity – J. Lacey noted that work group is developing list of questions. Once questions are identified then the question of the feasibility of addressing and the cost vs. benefit needs to be addressed. The BMM/RSS felt that once the questions were identified, a issue paper should be drafted that looks at the feasibility questions, the cost-benefit issue, and possible options including resources for addressing those questions that are feasible and make sense to from a costs-benefit standpoint. Partnering with the North Bay should also be looked at as one of the options. **ACTION: Tom M., as a first step, will look into the possibility of the RWQCB staff developing the issue paper. Tom will also look into the level of effort and resources to establish and maintain the work group. Tom will report back to BMM, as needed. J. Lacy will circulate questions to interested members.**
  - b) Update on CSJ Bioassessment – Dave Tucker reported that CSJ is working with S.F. State, currently waiting for proposal, expect to take back to EO for approval, start sometime in Dec./Jan., 4-year, 500K program. Deborah J. noted that the proposal should be reviewed openly and requested a copy as soon as it is available. Trish wanted to know about expanding to cover zooplankton and could North Bay participate. Trish noted that SFEI might be able to put in some limited resources. **ACTION: Wil will send proposal out as soon as it is submitted to RWQCB for review.**
  - c) Update Table 4-1 CAP (Urban Runoff Baseline) – Adam reported on work efforts of Storm Water permit Work Group. Adam distributes a June 22, 2000 version of Table 4-1. The BMM reviewed Table and made a number of edits. **ACTION: Adam will**

**incorporate edits into final draft of Table 4-1 and will distribute ASAP. Comments are due from BMM/RS by July 24, 2000.**

- d) Update on Track and Encourage Activities (B-17 & 18) – Trish briefed group on these activities. Trish handed out her May 7 e-mail that includes information on who is doing what relative to B-17, 18 and 20. Trish also handed out Rainer's Jan 20 e-mail re. Work that RMPTS is doing that may be helpful to CAP. Trish noted that South Bay representatives need to participate in TC at a higher level and push uncertainty agenda. **ACTION: Local agencies will look into greater participation. ACTION: BMM will look at Rainer's memo relative to B -1 and 18 at August meeting.**
  - e) Discussion on POTW CAP Activities (B-19 & 20) – The City of Sunnyvale handed out proposed text for B 19. B -20 was edited by BMM/RS as part of review of Table 4-1. **ACTION: Incorporate changes into Table 4-1 and distribute ASAP for comment by July 24.**
- Issue Bin:
    - Consider discussing newspaper article on PG&E PCB dumping at future meeting.
    - Need to define BMM subgroup connection to RMP to track RMP efforts. Tom M. will begin looking into defining issue and possible solutions.

#### **Wrap Up**

- BMM members felt that desired meeting outcome was achieved.
- Did not have time to review issue bin items.
- BMM/RS Meeting Schedule:
  - July 27, 1-3:30 at San Jose (ESB): review POTW language, finalize CAP Table 4-1, and status of NAP
  - August 9, 10-12 at San Jose: review findings in both POTW and Storm water permits for consistency.
  - August 23, 10-3 at San Jose: final review of POTW permit prior to release for public review.

**Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)  
Response to the October 31 2002 Mercury TMDL Implementation Plan Presentation  
Mercury Council Meeting**

**I. General Comments**

Thanks for all your hard work on the October 31 Mercury Council presentation. The SCVURPPP has a few preliminary comments and questions regarding the mercury source assessment and associated implementation plan. A more comprehensive review of the draft reports developed through the Clean Estuary Partnership will be provided in the near future.

The presentation suggested that reducing the “controllable” sources of total mercury to the proposed levels would reduce fish tissue concentrations to acceptable levels. In other words, if dischargers reduce Hg loads to the levels in the presentation, wildlife, fish, and humans will no longer have to worry about mercury toxicity and bioaccumulation over some time frame. However, the data to support this assumption are not apparent. There are major data gaps, assumptions, uncertainties, and rationales that were not adequately discussed in the presentation. For example, slide 9 illustrates that there is currently a 21% exceedance of Hg water quality criteria. It is suggested that control measures (via load reductions) will reduce Hg exceedances of water quality criteria to 10%. Why not 15% or 5%? What is the rationale for picking 10%? There are many of these type of examples throughout the presentation that seem arbitrary, or at best have high uncertainty that is not well defined. (i.e., linkage analysis = 1:1 relationship and the rationale for determining % reductions for each source).

The central problem is the lack of an adequate bay-wide Hg conceptual model, as mentioned in a letter to the San Francisco Bay RWQCB from the SCVURPPP dated November 15, 1999. The model should, at a minimum, summarize the current understanding of mercury cycling and fate in the bay; estimate source loadings; estimate mass balance; describe uptake and toxicity from both an ecological and human health perspective; and attempt to quantify the uncertainties associated with all of these factors. The development of this type of model was also recommended in a letter from the U.S. EPA, Region IX, dated December 18, 2000, discussing the review of the mercury TMDL Report. Without the foundation of an adequate conceptual model, we may foster public misconceptions and false expectations regarding the attainability of the suggested goals.

Below we have provided a few general comments/questions pertaining to the presentation, followed by more specific comments on source assessment, load allocations, and the implementation plan.

**General Questions**

1. Has an assimilative capacity analysis been completed for the entire bay? If not, what are the plans and schedule for completing the analysis?
2. Why is a simple steady-state model used, in light of North Bay sediment core profiles that appear to show mercury declining sharply after about 1980?
3. The mercury TMDL report, included the remobilization of historic sediments as a component of the source assessment. The estimate was between 100 and 400 kg/yT in the report. In the presentation, sediment remobilization was included in ‘other sources’, which was allocated a load of 28 kg/yr. Why such a drastic change?

DRAFT – Submitted to RWQCB staff Nov. 15, 2002 via e-mail

4. Slide 9 of Bill's portion indicates 21% of grab samples exceeded the 0.025 ug/L Hg objective. Were all these samples from north of the dumbarton bridge where this objective is in place?
5. Why make the assumption that there is a 1:1 relationship between changes in total mercury inputs and concentrations in fish and wildlife in the linkage analysis? What is the rationale and scientific evidence to support this assumption?
6. Richard mentions all the uncertainties in slide 25, which leads us to believe that we know very little about the extent of the problem, risk to humans and aquatic biota, and how to solve the problem. So how can we say we know enough to move on? We have no idea of the extent and location of methylation and how beneficial uses will respond if proposed reductions are put into place. It makes me question why we are moving forward into load allocations/reductions, which may have major cost implications to storm water programs, when we do not have reasonable assurance these reductions will change mercury concentrations in fish/bird tissue or bird eggs.
7. In slide 58, Richard discusses "Adaptive Management". This concept is not well defined. What is the process and timeline of including new data that suggests changes (increases or decreases) in load allocations, methylation potential, sediment loads, linkage analysis, and other key concepts in determining the sources of the problem? How does this translate into initial Basin Plan Amendment language and subsequent revisions?
8. Will a source control/load reduction cost-benefit analysis be conducted? If so, when? What are the legal requirements for conducting a cost benefit analysis? How does BAT and MEP fit into the cost benefit analysis?
9. What is the regulatory/legal meaning of "target"?
10. How does the RWQCB plan to incorporate and utilize the significant body of scientific research being conducted by CALFED?
11. What specifically are the RWQCB's plans to have all their work products technically peer reviewed by an independent outside third party?
12. The specific process for receipt, review and comment on RWQCB products is unclear. The current release of numerous documents and essentially no time to provide even a cursory review has caused significant confusion and anxiety regarding the RWQCB process to provide a meaningful public review and comment process. What specifically are the RWQCB's plans to ensure that a meaningful public review process is conducted?
13. Our initial review of the RWQCB staff slides (specifically slide 46) indicates that a significant resource burden could be placed on municipal stormwater programs regarding addressing areas of uncertainty. For example, How (both from a qualitative and quantitative standpoint) will addressing this uncertainty improve the analysis and estimates made by the RWQCB staff? Has the CEP and/or any other expert group reviewed the need for this additional information?

## **II. Hg Source Assessment for Urban and Non-urban Runoff**

**Background:** It is our understanding that the total Hg load allocation for urban and non-urban storm water was estimated through the following steps:

- A. Calculate total sediment load to the Bay from Bay Area watersheds (i.e., excluding the Central Valley) (Krone, 1979 & Davis et al., 2000) = **707 M kg/yr**
- B. Calculate % of urban and non-urban area of Bay Area watersheds:

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Non-urban = 73%

Urban = 27%

- C. Calculate sediment load from non-urban and urban areas discharging to the bay by multiplying % of urban/non-urban areas by total sediment load

**Non-Urban sediment load:**  $707 \text{ M kg/yr} \times 0.73 = 516 \text{ M kg/yr}$

**Urban sediment load:**  $707 \text{ M kg/yr} \times 0.27 = 191 \text{ M kg/yr}$

- D. Calculate average concentrations of Hg in urban and non-urban streamstorm drain sediments (Gunther et al. 2002 & KU 2002):

**Non-urban = 0.12 mg/kg**

**Urban = 0.50 mg/kg**

- E. B. Calculate urban and non-urban Hg loads by multiplying associated sediment load and average Hg concentration for urban and non-urban areas:

**Non-urban:**  $516 \text{ M kg/yr} \times 0.12 \text{ mg/kg} = 62 \text{ kg/yr}$

**Urban:**  $191 \text{ M kg/yr} \times 0.50 \text{ mg/kg} = 95 \text{ kg/yr}$

Questions from calculations of Hg loads from urban and non-urban storm water (Steps A-B)

**Step A:**

1. Where does the estimate of total sediment from bay area watersheds come from? We have reviewed Davis et al. 2000 and Krone 1979 and not found the estimated load at 707 M kg/yr.
2. Was the % of land upstream of dams taken out of these calculations? If not, the a significant portion of the sediment (and mercury) load might currently be removed by reservoirs (e.g., Davis et al. 2000).

**Step B:**

3. Where did the % for urban and non-urban areas originate? Was the % of land upstream of dams taken out of these calculations?
4. Should the current removal of sediment from flood control channel dredging projects and catch basin cleaning taken into consideration when developing the total sediment load estimates from urban and non-urban watersheds, as was done in the dredging allocation?

**Step C:**

5. Why are we assuming that the volume of sediment originating from a given area of urban landscape is equal to the same area of non-urban landscape? What is the rationale?

**Step D:**

6. Are these concentrations means or medians? What are the uncertainty and variability in sediment loads and Hg concentrations.

**Step E:**

7. Was future growth considered in the calculations? We realize that the New Development Provision (C.3.) will likely reduce a portion of mercury latent sediment entering the bay,

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but it is certainly not assumed that 100% of mercury originating from new development (future growth) will be removed in the future, is it?

### **Dividing up the Urban SW Load:**

The following %'s of the urban load allocation should be determined prior to submittal/approval of the Implementation Plan:

- % to Caltrans
- % to automobile wreck yards (i.e. potentially cover under the new permit)
- % to Port of Oakland
- % reduced by Flood Control Sediment Control
- % reduced by catch basin cleaning
- % air deposition (outside of municipalities jurisdiction)

### **III. Linkage Analysis**

1. The current linkage analysis and assumptions of a 1:1 relationship between total mercury concentrations in sediment entering the bay and fish tissue concentrations is inadequate. As mentioned in the our opening comments, a more detailed conceptual model of mercury cycling in the system is needed. This should include a quantitative analysis of the following:
  - % of Hg in sediment transported to methylating regions in the Bay;
  - % and rates of Hg in methylating regions converted to methyl Hg;
  - %, rates, and risks of Hg entering food web at various trophic levels; and,
  - Bioaccumulation rates of methyl Hg in various species in the food web.

What are the plans and schedule for completing such a conceptual model?

### **IV. Load Reductions**

1. What rationale was used to determine the load reductions for all sources. Why 5% CV, 60% urban storm water, etc....
2. Is the atmospheric deposition component (what ever it is) of the storm water load actually “controllable”? If so, who has the jurisdiction to control inputs from atmospheric deposition? If not should this load be excluded from the storm water allocation?

Alameda Countywide  
Clean Water Program

Contra Costa  
Clean Water Program

Fairfield-Suisun  
Urban Runoff  
Management Program

Marin County  
Stormwater Pollution  
Prevention Program

San Mateo Countywide  
Stormwater Pollution  
Prevention Program

Santa Clara Valley  
Urban Runoff Pollution  
Prevention Program

Vallejo  
Sanitation and Flood  
Control District



B A S M A A

July 22, 2003

Bill Johnson and Richard Looker  
California Regional Water Quality Control Board  
San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

**Re: Mercury in San Francisco Bay Total Maximum Daily Load (TMDL)  
Project Report**

Dear Bill and Richard:

This letter is submitted on behalf of the Bay Area Stormwater Management Agencies Association (BASMAA) in response to the invitation to submit comments on the *Mercury in San Francisco Bay Total Maximum Daily Load (TMDL) Project Report (Report)*, dated June 6, 2003.

BASMAA member agencies would like to thank you for this opportunity to comment on the Report and commend each of you for your hard work in finalizing the document. We also recognize the staff to, and participants of, the Regional Monitoring Program for Trace Substances (RMP) and Clean Estuary Partnership (CEP) for their contributions to this milestone.

Impairments to beneficial uses of water bodies in the San Francisco Bay Area are of utmost importance to BASMAA. Furthermore, we agree that reducing impairment of beneficial uses by mercury in the Bay should be a high priority for all Bay Area public agencies and citizens. For storm water programs, concern for elevated mercury concentrations in the San Francisco Bay biota have caused us to refocus a portion of our public resources over the past few years towards reductions of mercury levels in urban runoff that may be contributing to beneficial use impairment in the Bay. BASMAA member agencies plan to continue allocating valuable resources towards regional collaborations such as the CEP and RMP, designed to collect scientific information necessary to develop cost effective measures aimed at improving water quality in Bay Area water bodies. We, as public agencies, take this task very seriously. Therefore, we believe a fair, objective and transparent TMDL and related Basin Plan Amendment based on the best available information and sound science, which states its assumptions and uncertainties throughout the document, is important to its legitimacy, legality, and public confidence.

The preliminary comments contained within this letter are designed to be constructive in nature. Comments are provided to address what BASMAA member agencies regard as unresolved issues related to the content of the Mercury TMDL Project Report. Comments are arranged in three sections: comments on the public review process and stakeholder involvement, general comments on the Report, and comments specific to sections within the Report. As requested by Regional Board staff, specific suggested improvements are

Bay Area

Stormwater Management

Agencies Association

1515 Clay Street

Suite 1400

Oakland, CA 94612

510.622.2326

[www.basmaa.org](http://www.basmaa.org)

provided for each issue discussed. Most of the suggested improvements entail a change in the text to clarify language within the Report, thus reducing public misconceptions and false expectations by instead stating assumptions and uncertainties in a transparent and clear manner.

It is our understanding that comments such as these will be considered by Regional Board staff prior to developing amendments to the Water Quality Control Plan for the San Francisco Bay Region (Basin Plan), which are tentatively scheduled for adoption later this year. While we believe our exchange of information at this point in the process may be useful, we want to emphasize that notwithstanding this and prior public outreach efforts, the Regional Board needs to provide sufficient time for a meaningful official public comment and scientific peer review process once a proposed Basin Plan Amendment is prepared.

Because of the significant implications of such a Basin Plan Amendment, the demands it will impose, and the amount of time and public resources it will likely consume, we want to emphasize that our current exchange of information will be no substitute for providing adequate time (in our estimation at least 6 to 9 months rather than the typical 4-8 weeks) for meaningful peer review of and public comment on an actual Basin Plan Amendment.

In addition, even though the Regional Board is exempt from certain provisions of the California Environmental Quality Act ("CEQA") with respect to Basin Plan amendments, the Regional Board is still obligated to consider the potential environmental impacts of the proposed amendment. CEQA policy demands that the Regional Board make available information relevant to the proposed amendment's impacts "as soon as possible" and consider comments "at the earliest possible time in the environmental review process." (See Public Resources Code § 21003.1.) However, the Regional Board's June 6, 2003, transmittal states that the required CEQA analysis will not be provided until the release of the staff report supporting the proposed amendment. This simply does not allow us, or other members of the public, sufficient time to provide comments that will be meaningful or useful to the Regional Board.

Finally, as you know, the proposed implementation plan has many new proposed requirements that storm water programs may be required to implement. Therefore, we ask that the suggested improvements contained within this comment letter be incorporated into a revised TMDL Mercury Project Report and staff recommendations for the proposed Basin Plan Amendment. To clarify these suggested improvements and proposed requirements, we request that Regional Board staff from the TMDL section and storm water permitting section meet with BASMAA representatives during the preparation of Basin Plan amendments and associated staff reports to discuss our concerns and work together to incorporate the suggested changes to the TMDL Project Report and implementation plan into a revised TMDL Project Report and proposed Basin Plan Amendment.

#### **STAKEHOLDER AND PUBLIC REVIEW PROCESS:**

As you know, BASMAA supports a transparent stakeholder and public review process and we believe that involving all stakeholders throughout the process is a goal the Regional Board should strive for during the development of all TMDLs and associated Basin Plan amendments. Therefore, the lack of: 1) more meaningful communication between Regional Board staff and stakeholder representatives regarding specific aspects of the Report relevant to those stakeholders, and 2) assurance of a full, adequate, and meaningful peer review and public review process for a proposed Basin Plan Amendment, are of substantial concern.

The lack of meaningful communication from Regional Board staff is evident in the new language and calculations that are apparent throughout the Report. When compared to the draft version (2000) and the presentation by Regional Board staff to the Mercury Council, on October 31, 2002, many differences are of concern. For example, estimates of total sediment loads used to calculate current mercury loads from urban and non-urban storm water runoff have changed. These changes have created a greater proposed load reduction allocation for urban runoff programs. These changes were not discussed with municipal storm water program representatives prior to the release of the TMDL Project Report.

Issues like this could have been clarified and resolved early in the process if the quantity and quality of communication between the Regional Board staff and stakeholders (storm water program representatives in this case) was improved. In fact, in a meeting between Regional Board staff and BASMAA representatives on November 19, 2002, we suggested that a process for ongoing discussion and review should be established. Regional Board staff agreed to try to distribute timely updates that affect storm water programs. Unfortunately, the aforementioned process and timely updates never materialized. Quite the opposite, comments on the TMDL Report were requested, but as indicated in Tom Mumley's letter, dated June 6, 2003:

*"...staff do not intend to formally respond to comments received or revise the report."*

In other words, the message to us has been "the Report is finalized". In our opinion, this is not an adequate, meaningful, nor transparent stakeholder or public review process. If a *draft* Report had been released to stakeholders and an opportunity for input provided before its finalization, we believe the report could have adequately addressed many of these issues.

**Suggested Change** – We strongly suggest that the Regional Board improve the public review and stakeholder process for the development of future TMDLs (e.g., PCB TMDL for the San Francisco Bay). To improve this process, Regional Board staff should provide updates to relevant stakeholders before a TMDL Report is finalized. Likewise, we strongly suggest that stakeholders be allowed to review and provide comment on the Staff's version of a Basin Plan Amendment *before* it is officially "proposed" and released for public comment. This will allow stakeholders to comment on documents before they are likely institutionalized. Additionally, this will allow stakeholder representatives to better prepare constituents for proposed requirements and implementation actions that will require an increased allocation of limited resources.

### **Lack of Response to Comments**

Many of the comments presented in this document were previously communicated to Regional Board staff by BASMAA member agencies (SCVURPPP 2002 and BASMAA 2002). However, on most issues no response was given by Regional Board staff. We are cognizant of the fact that State resources are limited at this time; however responding to comments and concerns of stakeholders that will be directly affected by the proposed TMDL is an important task and there is little incentive or point in commenting if our input is ignored or no feedback or dialogue will be forthcoming prior to release of the proposed Basin Plan Amendment. For example, one of the major points that was made in previous comments by BASMAA member agencies was that large areas of uncertainty, including the calculations used in the source assessment and the controllability of air deposition included in the urban storm water load, were not adequately addressed in the draft TMDL Report or presentations by Regional Board staff. After review of this TMDL Report, it appears that it still does not adequately address the uncertainties behind loading calculations and the controllability of indirect air deposition.

**Suggested Change** – We suggest that the Regional Board respond to comments received, in a timely manner and in a format that is directly responsive to the input provided, during the development of future TMDLs and in advance of the release of proposed Basin Plan amendments. If stakeholders know their comments will be addressed and expect to see direct responses to them, they will likely have comments and concerns that are of interest and useful to staff.

## GENERAL COMMENTS:

### Definition of “Controllable” and Responsible Parties

The term “controllable” is used throughout the report. Staff’s use of the term appears to be based on what regulatory mechanisms are currently available to the Regional Board rather than on whether the actual source of the pollutant is actually subject to regulatory control by the discharger or whether the resultant amount of loading can be subject to technically feasible and economically reasonable management or treatment. For example, as described later in this letter, a significant portion of the estimated current urban storm water load and proposed allocation is likely attributable to indirect air deposition onto the watershed. BASMAA believes that this portion of the urban runoff load is likely to continue for many years to come, begging the question of whether this portion of the urban runoff load can be controlled by urban runoff programs in any meaningful, let alone technically feasible and economically reasonable, manner.

In contrast, we have faith that the total load of mercury originating from sources that are truly controllable by urban runoff programs will be reduced over time through pollution prevention activities. However, neither local municipalities (nor the Regional Board) have jurisdiction to regulate the mercury continuously deposited onto the watershed from global or local atmospheric sources, and therefore it makes no sense to assign/allocate these sources as the legitimate responsibility of urban runoff programs.

In fact, atmospheric deposition directly to the Bay is considered elsewhere in the Staff Report to be “uncontrollable”, according to the proposed implementation plan for atmospheric deposition:

*“In view of the degree to which uncontrollable sources appear to dominate Bay Area air concentrations and presumably deposition, load reductions do not appear feasible at this time.”*

This is just one example of how the terms controllable and uncontrollable sources are inconsistently used and misused to establish waste load allocations. We find that the lack of a formal definition of these terms and analysis concerning the legitimacy of their application causes confusion and results in the significant misallocation of the waste loads set forth in the Report. Therefore, we believe that it would be hard to show beyond a reasonable doubt that any of the sources is more or less controllable than any other, particularly with the relatively limited data currently available regarding controllability early in a 120-year TMDL implementation period.

**Suggested Change** – For the purposes of this TMDL Report, which assigns preliminary load and waste load allocations, we suggest using a more objective, scientific, and prudent approach of assuming that all sources have the same level of controllability or uncontrollability unless scientific evidence is developed to the contrary. Prior to the adoption of other TMDLs, we suggest that when calculating current loads and waste load allocations the Board should adopt a definition of controllable and uncontrollable sources based on factors such as feasibility,

economic capacity, and legal jurisdiction of the dischargers. As part of the adaptive implementation plan, these definitions should be used when revising preliminary load and waste load allocations that were assigned in the Mercury TMDL Report. Furthermore, the responsible parties for which the loads originated, should only be assigned the loads that are controllable; allocations should not be assigned to dischargers just because the parties happen to be subject to the Regional Board's jurisdiction.

### **Need for Sensitivity Analysis and Description of Uncertainties**

As described in the Report, water and sediment circulation patterns, biological interactions, and contaminant transport processes, are complex in the San Francisco Bay estuary. We acknowledge that adequate data is currently not available to estimate current loads from most sources and predict the recovery of the Bay with certainty. Therefore, we believe it is important to state inherent assumptions and uncertainties throughout the Report and illustrate these uncertainties in projected recovery simulations.

One way to illustrate uncertainties is by conducting a sensitivity analysis of estimated mercury loads from particular sources. Therefore, scenarios could be developed which could be displayed in projected recovery curves under different assumptions based on the sensitivity of recovery curves as a result of changes in the estimated load from a particular source(s).

This type of analysis would better explain the uncertainties with load calculations and demonstrate how the Bay would respond under a variety of different assumptions.

***Suggested Change*** – Revise the source assessment and load allocation sections of the Report to include ranges of estimated current loads and waste load allocations, instead of single values. Single values typically are institutionalized quickly and may give the public significant misconceptions regarding the mercury load from particular sources. Additionally, perform a sensitivity/uncertainty analysis on the projected recovery curves based on a variety of scenarios. The ranges of estimated current loads and waste load allocations would aid in this exercise. Once completed, the recovery curves under a variety of scenarios should be illustrated in the Report. The selection of such scenarios should reflect the model parameters with greatest uncertainty (e.g., loading due to bed erosion).

### **Accounting and Allocations**

Full accounting of sources AND losses (as shown in table 4.1 and figure 4.1) should be carried through the entire TMDL. There is no scientific basis and it is not prudent to stop accounting for all known sources and assumed losses (as shown in table 7.1 and figure 7.1) This jeopardizes any reasonable assurance that implementation of the TMDL will attain water quality standards. The values shown for the sources and losses could and most likely will change over the course of the planned multi-decadal TMDL implementation period.

As pointed out in the Project Report, mercury loads are equal to sediment loads times sediment concentrations. Yet the approach used later in the Report to determine TMDL allocations varies depending on the source. Sometimes the allocations are based on mercury loads but often they are driven by only one of these factors – sediment concentrations. We believe TMDL allocations should be established on a consistent basis – one based on mercury loads.

Given the high level of uncertainty, and the current inconsistent and highly subjective definition of controllable (as discussed above), the science does not support any other preliminary allocation scheme than one based on requiring each source AND loss to be the same

proportion of the solution as it is of the problem. That is, for a given source, its percent of the solution (i.e., allocation or reduction) should be equal to its percent of the problem. Losses should be zero percent of the solution since they are equal to zero percent of the problem. However, it is important that their negative loads are maintained so their allocations should remain equal to or less than their current negative loads. Re-calculating the values in table 7.1 based on these concepts yields allocations:

- that are objective, acknowledge the lack of scientific evidence of controllability or uncontrollability, and are established on a consistent basis – mercury loads;
- that are more evenly distributed where the burden on any one source is reduced; and
- in which all sources (including those that need further investigation) and losses remain accounted for in one place.

**Suggested Change** – Table 7.1 and figure 7.1 should be expanded to include all “sources” and “losses” (i.e., same as table 4.1 and figure 4.1). In addition, based on the concept that “percent of the solution” = “percent of the problem,” Table 7.1 (and similarly figure 7.1) should be modified as follows:

**TABLE 7.1: Proposed Load and Waste Load Allocations**

Sources	Current Load Hg kg / yr	Percent of Problem	Allocation Hg kg / yr	Reduction Hg kg / yr	Percent of Solution
Bed erosion	460	38	266	194	38
Central Valley watershed	440	36	254	186	36
Urban runoff	141**	12	79	62	12
Guadalupe watershed	92	8	54	38	8
Atmospheric deposition					
Direct	27	2	16	11	2
Indirect	55	5	32	23	5
Non-urban runoff	<0**	TBD	TBD	TBD	TBD
Wastewater	19	2	11	8	2
Local mines	TBD	TBD	TBD	TBD	TBD
Contaminated Bay margin sites	TBD	TBD	TBD	TBD	TBD
Subtotal	≈1,219	>100	705*	514	>100
<b>Losses</b>					
Transport out Golden Gate	(1,400)	NA	(1,400)	0	NA
Dredging and disposal	(150)	NA	(150-430)	0	NA
Evaporation	(190)	NA	(190)	0	NA
Subtotal	(1,740)		(1,740)	0	
Total	(521)		(1,035-1,315)	514	

All values rounded to nearest integer

\* Based on proposed total allocation presented in TMDL Project Report

\*\* Estimated indirect air deposition (55 kg/yr) removed from estimated urban and non-urban storm water runoff current load. See specific comments on p. 9 of this comment letter, and allocations, pp. 10-11

TBD = To be determined

NA = Not applicable

**SPECIFIC COMMENTS:****Problem Statement (Section 2)**

Although the document is specific to the mercury pollution in the San Francisco Bay (Bay), it would be useful to include a statement regarding the issue of mercury pollution worldwide. Context is important when stating an environmental issue such as mercury pollution in the Bay. Readers should know that San Francisco Bay is not the only water body containing elevated levels of mercury. Mercury pollution has recently been recognized as a global problem. In February 2003, the United Nations agreed that, "there is sufficient evidence of significant global adverse impacts from mercury and its compounds to warrant further international action to reduce the risks to human health and the environment."

**Suggested Change:** Include a statement or two indicating mercury pollution in surface waters is a global issue, and is not specific to the San Francisco Bay.

**Mass Budget Approach (Section 3)**

The text in the mass budget approach section of the Report states:

*"Mercury fate and transport processes within the bay vary significantly throughout time and space, and available data are insufficient to support detailed analyses without over-interpreting the limited data. Therefore, this report relies on a simple model to represent the San Francisco Bay and some of its basic processes. The advantages of simplicity—the ability to identify and prioritize reasonable actions without over-interpreting the data—outweigh the apparent realism that could be attainable with a more complex model (Harte 1988)."*

We agree that the Bay is a complex system and a simple (one-box) model has its advantages as described. However, a simple model also has inherent disadvantages that are not described in the Report. For example, sediment transport processes of the Bay can vary drastically between segments and with time, making the one-box model far too simple to accurately estimate mercury sources and losses over a given timeframe. Therefore, it is important to include language stating that the complexity of the system could greatly undermine the assumptions and calculations made using the one-box model. Simply stating the estimates made were based on available data does not go far enough to explain the uncertainty of the conclusions that are being drawn in the Report and upon which all load calculations are based.

**Suggested Change** – Include language indicating that using a one-box model incorporates great uncertainty in estimating mercury sources to, and losses from, San Francisco Bay. Additionally, we request that a discussion of the disadvantages of using a one-box model to the same extent the advantages were discussed.

**Source Assessment (Section 4)**

The following comments and suggested changes are related to sub-sections of Section 4, Source Assessment:

- **Calculations and Assumptions:**

- **Bed Erosion** – BASMAA agrees that bed erosion is likely the largest source of mercury to the bay, given past resource management history (i.e., mining) and the likelihood of bed sediments continuing to erode. Therefore, we believe providing the best estimate of bed erosion for the entire bay is of utmost importance when determining sources of mercury. The report's estimates do not attempt to include bed erosion from segments other than San Pablo and Suisun Bays. Although burial and erosion estimates have not been published for these segments, it appears that preliminary estimates could be calculated and included in this Report. A large amount of resources have been used to calculate load estimates from other sources, which are based on very little information, so why not attempt to assess potential bed erosion from the south, lower and central bays? BASMAA believes that without an assessment and quantitative estimate of bed erosion, the largest source of mercury to the bay may be grossly underestimated, potentially having great consequence on estimated recovery times and necessary load reductions assigned to other sources.

***Suggested Change*** – Include estimates of potential bed erosion from segments other than Suisun and San Pablo Bays when calculating the mercury loadings to the Bay. State assumptions and uncertainties related to these estimates.

- **Storm Water** – As indicated in previous comments from storm water agencies on the Mercury TMDL for the San Francisco Bay (SCVURPPP 2002, BASMAA 2002), BASMAA has many concerns regarding the calculations used to estimate current storm water loads. BASMAA continues to suggest that the methods and a portion of the data used to calculate urban storm water runoff mercury loads are inappropriate as a basis for establishing regulatory criteria or actions. In particular:

- **Use of bedded sediment data** – As described in previous comments from BASMAA member agencies, we believe that the use of bedded sediment data from the Joint Stormwater Agency Project report to establish current loading estimates for urban and non-urban storm water introduces very high uncertainty. Loading estimates made in the Joint Stormwater Agency Project were very rough estimates based on available data collected for a different objective, and were only calculated at the request of Regional Board staff. The San Francisco Estuary Institute (SFEI) has more recently commented that it is not possible to determine the bias and error associated with loading estimates based on bedded sediment concentrations. The Clean Estuary Partnership/SFEI study to estimate pollutant loads from the Guadalupe River is designed to produce better loading estimates (at least for one local tributary) based on suspended sediments and demonstrate improved methodologies.

***Suggested Change*** - We suggest that the Report be revised to better identify and explain the ranges and associated uncertainties of storm water loading estimates. The text should also mention the issues regarding the compatibility of bedded vs. suspended contaminant concentrations used in the Report. We also suggest that procedures or criteria be outlined for refining these estimates during adaptive implementation process.

- **Atmospheric Deposition** – A previously mentioned, the Report includes estimates of dry and wet deposition of mercury directly deposited onto the bay. However, estimates of indirect deposition onto the watershed are included in the storm water load estimates, not in the atmospheric deposition load. As the TMDL Report states, as much as 55 kg/yr (nearly 30%) of the storm water mercury load could be from indirect atmospheric deposition onto the watershed.

**Suggested Change** – The estimated 55 kg/yr, attributable to indirect air deposition, should be removed from the storm water load estimate. This load should instead be included in the air deposition source category as “indirect atmospheric deposition” and itemized separately in Tables 4.1 and 7.1.

### **Linkage Analysis (Section 6)**

Comments regarding the linkage analysis were previously submitted by BASMAA member agencies (SCVURPPP 2002). We are disappointed that no response to these comments has been issued and that further dialogue on this critical component of the TMDL has not occurred. Therefore, because of their critical importance from our perspective, we are reiterating our prior comments here.

The report and previous presentation simply assume without justification that a linear relationship exists between changes in total mercury concentrations in bay sediments and changes in fish tissue and bird egg mercury concentrations. We believe a much more detailed linkage analysis is needed, which would be incorporated into an expanded conceptual model and analysis of mercury cycling in the system. This should include a more thorough quantitative analysis of the following:

- percent of mercury in sediment transported to methylating regions in the Bay;
- percent and rates of mercury in methylating regions converted to methyl mercury; and,
- percent, rates, and risks of mercury entering the food web at various locations in the bay and various trophic levels.

BASMAA will continue to support the efforts currently underway within the CEP, RMP and other scientific programs aimed at providing such analyses.

**Suggested Change** – We suggest that the Implementation and Adaptive Management sections of the Report include specific language stating that:

*The uncertainty associated with the current linkage analysis is extremely high due to limited data. The relationship between sources, loadings and wildlife endpoints is essentially unknown at this time. If new scientifically valid information is available in the future regarding the effects of load reductions in the Bay, load allocations, recovery projections, and requirements outlined in the implementation plan will be expeditiously and explicitly revised to reflect this current state of knowledge regarding sources of impairment and recovery of the Bay.*

- **Mercury Sources and Sediment** – The last paragraph at the bottom of page 36 states that:

*“...tributaries, such as the Sacramento and San Joaquin Rivers, the Guadalupe River, and other local tributaries carrying storm water runoff, are the largest sources of mercury to San Francisco Bay.”*

This statement is misleading, and should be qualified to acknowledge that the estimated relative contribution of mercury from local tributaries is small when compared to larger sources (e.g., Central Valley) and bed erosion may be the largest contributor to impairment of beneficial uses in the Bay.

**Suggested Change** – Change statement to appropriately qualify the relative contribution of mercury from local tributaries and to indicate that bed erosion is estimated to be the largest contributor to impairment of beneficial uses in the Bay.

- **Methylmercury Production** – As described in the Report, methylation is a key pathway in the bioaccumulation of mercury in biota (i.e., fish tissue, bird eggs, and humans). Without mercury methylation, we would likely not have elevated mercury concentrations in these biota and therefore would not need a TMDL. Therefore, we believe it is critical not to downplay the importance of methylation in the Report. To meet the wildlife and fish tissue targets, the Report indicates that loading of mercury from “controllable” sources must be reduced (Section 7 – Allocations). However, the Report relies on only two citations (Rudd et al. 1983 and USGS 2001c) in developing the proposed linkage between total mercury concentrations in surface sediment (i.e., sources) and methylmercury production. Furthermore, based on this proposed linkage, the Report states definitively on page 38 that:

*“Reducing mercury loads will reduce methylmercury production”*

BASMAA agrees that reducing mercury loads is an important goal, but finds that this statement is misleading. As you know, the scientific community does not currently agree that this statement is in fact true for the Bay. Many scientists believe that methylmercury production may be better reduced through the management of methylating regions (e.g., wetlands). Therefore, it may give the public false expectations and misconceptions about whether reduction of sediment concentrations is accepted by the scientific community to be the most critical variable in reducing mercury impacts on biota.

**Suggested Change** – As recently suggested by Regional Board staff, the TMDL process should embrace the scientific method of stating hypotheses and testing these hypotheses through the adaptive management process. Therefore, in the essence of the scientific method, we suggest that this statement be revised to include language such as, “Based on these studies our working hypothesis is that reducing mercury loads will reduce methylmercury production in all segments of the San Francisco Bay”.

#### **Allocations (Section 7)**

- **Load and Waste Load Allocations** – The value (1,420 kg/yr) assigned to *Current Mercury Load (Total)* in Table 7.1 is inconsistent with the rounded value (1,220) in Table 4.1. Additionally, no reductions are assigned to air deposition or non-urban storm water.

**Suggested Change** – Revise Table 7.1 current load column and the text under point 1. on page 50 to be consistent with the above comments and Table 4.1.

- **Urban Storm Water Runoff** – The following concerns are related to the proposed load allocations for urban runoff:
  - **Controllable vs. Non-Controllable** – The Report suggests that “controllable” sources of mercury are in part responsible for mercury in sediments from urban storm water. Furthermore, it states that:

*“Atmospheric deposition and natural background also contribute to the mercury in urban runoff. These contributions are assumed difficult to control”.*

BASMAA appreciates the acknowledgment that these sources are hard to control. However, that acknowledgement has not been accounted for in the allocation. Since we have heard no response to questions posed by SCVURPPP in response to the Regional Board’s presentation at the October 31<sup>st</sup>, Mercury Council meeting, we reiterate those questions here:

1. Is the atmospheric deposition component (estimated to be 55 kg/yr) of the storm water load actually controllable? If so, on what basis has that conclusion been reached?
2. Who, if anyone, has the jurisdiction to control inputs from atmospheric deposition?

As you know, storm water programs do not have the jurisdiction to control atmospheric deposition of mercury onto local watersheds. Regulatory control of atmospheric metal deposition is the responsibility of international, national, state and local air quality agencies. Therefore, it is inappropriate to include the estimated 55 kg/yr of mercury from indirect deposition in the storm water runoff load estimates.

**Suggested Change** - Remove the estimated 55 kg/yr of mercury from the proposed storm water runoff loads estimated to be 160 kg/yr for urban and 25 kg/yr for non-urban, and assign the load to the air deposition source category. The resulting estimate of mercury from urban storm water runoff would be 141 kg/yr for urban and < 0 kg/yr for non-urban, based on the percent of urban land area and non-urban land area (KLI 2002). If implementation activities by urban storm water programs are found to control part of the mercury from air deposition or non-urban sources, these reductions can be addressed through the adaptive implementation process.

- **Thermometers as an urban runoff source** – There is no evidence to suggest that thermometers are a source of mercury to urban runoff.

**Suggested Change** – Remove references to thermometers in two places in the Report:

- (p. 44, *Urban Storm Water Runoff, second sentence*) - ...such as improperly discarded fluorescent lights, ~~thermometers~~, other ...
- (p. 56, *Urban Storm Water Runoff, third sentence*) -...including fluorescent light bulb ~~and thermometer~~ collection and disposal programs,...

**Use of population as a load allocation scheme** – When assigning individual waste load allocations to urban runoff programs, we are uncertain as to whether the service area population of each urban runoff management program should be used. Individual waste load allocations

could instead be assigned on the basis of other parameters, such as the percent of Bay Area urbanized land area within each storm water program service area, or some combination of population and urbanized land area.

**Suggested Change** – We suggest that the Regional Board work with urban runoff management programs to reconsider the allocation basis and scheme for the individual waste load allocations for urban runoff, and revise table 7.2 as needed and appropriate.

- o **Projected Recovery** – Two different values of “total current mercury inputs” are used in the Report and in the supporting document (i.e., SFBRWQCB 2003g). The Report uses the value of 1,420 kg/yr, while the supporting document appears to mention both 1,420 and 1,220 kg/yr. As previously discussed in the Source Assessment-Mercury Source Assessment and Methodology Section of this document, the estimated total should be 1,219 kg/yr, not 1,420 kg/yr.

It is not clear which of these values was used to predict the long-term response with and without proposed implementation measures. It is important to mention that if the 1,420 kg/yr was used in any of the modeling scenarios for projected recovery, the recovery time could be drastically affected. For example, if the recovery curve for current loads, with bed erosion phase-out (Figure 7.2) was presented in error using the 1,420 kg/yr value, the slope of the curve may be steeper than estimated.

**Suggested Change** – Review the values for total current mercury loads used to calculate the recovery curves for mercury in San Francisco Bay. Revise the text and tables of the above documents, and, if needed, the figures and projected recovery times.

### **Implementation Plan (Section 8)**

BASMAA has a variety of concerns related to the proposed implementation plan. As mentioned in the opening paragraphs of this document, BASMAA representatives request that a meeting(s) with Regional Board TMDL and Stormwater Permit staff be scheduled to further discuss our preliminary suggestions for improvements and clarification of the proposed implementation actions presented in the Report, as presented below.:

- o **Objectives** – The objectives of the implementation plan state that:

*“In developing implementation actions for various sources, this plan takes into consideration the.....the feasibility and cost of control”.*

However, within the proposed urban runoff implementation plan, the consideration of feasibility and cost of control is non-existent. Many of the suggested actions (e.g., additional pollution prevention activities, capture and treating storm water) may be infeasible and/or cost prohibitive. An analysis of each and its feasibility and cost must be forthcoming.

**Suggested Change** – Include an analysis describing how feasibility and cost of control was considered when developing the proposed implementation actions.

- o **Urban Storm Water Runoff** – The following concerns and suggested changes are related to the proposed urban storm water runoff implementation plan.

- **Lack of linkage between proposed actions and allocations** – Within the Report, no clear linkage is established between the proposed implementation actions for urban runoff (listed as proposed requirements on page 57), the associated proposed allocations and feasibility and cost. BASMAA agrees that pollution prevention activities and storm water treatment may reduce some of the estimated urban runoff mercury load. However, it is unclear as to what extent reducing controllable sources can help meet proposed allocations and to what extent feasible and economically reasonable storm water measures can be employed.

**Suggested Change** – Revise implementation requirements for urban storm water programs by identifying those proposed implementation activities that are technically feasible and economically reasonable as “early implementation actions” and include a statement that this list may be refined as part of continuing efforts by the storm water programs and other stakeholders. A preliminary draft model in Attachment 1 is intended to serve as a starting point to accomplish this task, and therefore, when finalized, will supersede the list of proposed requirements on page 57 of the Project Report.

- **Demonstrating Compliance** – Given the high uncertainties in current urban runoff load estimates presented in the Report and equivalent uncertainty regarding the feasibility, cost and effectiveness of storm water measures in reducing loads, BASMAA is very concerned about demonstrating compliance with the proposed requirements in the implementation plan in quantitative terms. Quantifying numeric load reductions via storm water control measures poses a significant problem for BASMAA member agencies, given the uncertainties and gaps in available baseline information. In addition, it is not clear how often the 5-year average is to be calculated, or how these results should be coordinated with the 5-year adaptive review of the TMDL. Furthermore, the first recommended method for storm water agencies to demonstrate compliance with proposed waste load allocations (i.e., quantify new mercury loads avoided through pollution prevention, sources control and treatment efforts) does not take into account that the data used to estimate current mercury loads is, at a minimum, two years old.

**Suggested Change** – Incorporate a table or listing similar to the *draft* preliminary model in Attachment 1, as a framework for coordinating the activities and reporting of the BASMAA agencies. This table is organized according to the main features listed for adaptive implementation on page 69. In addition, if asked to demonstrate load reductions in quantitative terms, BASMAA suggests that storm water programs should have the option to classify actions implemented after the data was collected (as early as the beginning of fiscal year 2001-2002), as “early implementation actions” for the purpose of complying with the urban storm water runoff allocation. (In practice, the feasibility of quantifying load reductions associated with actions implemented during the past two years will depend on the availability of appropriate data.)

- **Infeasibility of diverting flows to POTWs during wet weather flows** – The Implementation Plan for Urban Storm Water Runoff suggests that a portion of storm water during wet weather events could be diverted to Publicly Owned Treatment Works (POTWs) for treatment. However, the load allocations and Implementation Plan for municipal wastewater fails to include receiving these diversions, and past experience indicates that most plants will not accept wet weather runoff.

**Suggested Change** – Delete any reference to diverting storm water flows to POTWs or include it in both the Urban Storm Water Runoff and Municipal Wastewater sections of

the Implementation Plan as a possible action if determined to be feasible and cost effective and agreed to by the urban runoff program, POTW, and Regional Board.

o **Adaptive Implementation**

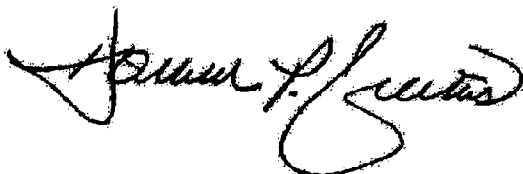
BASMAA agrees that an adaptive implementation process for the mercury TMDL is an integral part of TMDL process. Reviewing pertinent information collected during the implementation period on a consistent and rigorous timeline is critical to the success of the TMDL process.

**Suggested Changes** – We suggest the following revisions be made to the adaptive implementation section of the Report:

- o Revise the following to include a review of “immediate actions” (i.e., early implementation actions) as part of the 5-year reviews:
  - o (p. 69, last sentence) ...to evaluate findings from (immediate) actions, monitoring, special studies ...
  - o (p. 70, add to list of focusing questions):
    4. What reductions have been achieved or appear achievable based on evaluation of (immediate) actions? If the reductions / allocations do not appear achievable, how might the Regional Board implementation actions and/or allocations be modified?
- o Provide a more complete description and schedule for the planned 5-year reviews, at least during the initial 20-year implementation period. Many of the above comments, if not incorporated in the TMDL report, identify areas that BASMAA considers high priority for inclusion in this schedule.
- o Revise the Management Questions - TMDL Targets section (p. 76) to include a paragraph on the need for data to refine or validate sediment targets via studies associated with management question five (food web linkage).

We hope you find these preliminary comments and suggested improvements to the Mercury TMDL Project Report useful. As a next step, we suggest Regional Board staff from the TMDL section and storm water permitting section meet with BASMAA representatives during the preparation of the proposed Basin Plan Amendment and accompanying staff reports to discuss/clarify our concerns. In addition, we would like to work together to incorporate the suggested changes to the TMDL Project Report and implementation plan into a revised TMDL Project Report and proposed Basin Plan Amendment. Please contact me at (925) 313-2373 if you have any questions regarding the comments or suggested changes.

Sincerely,



Donald P. Freitas  
BASMAA Executive Board Chair

cc: Arleen Feng, BASMAA Monitoring Committee  
Jim Scanlin, ACCWP  
Kevin Cullen / Larry Bahr, FSURMP  
Bob Davidson, SMCSTOPPP  
Jack Betoume, VSFCD  
Liz Lewis, MCSTOPPP  
Adam Olivieri, SCVURPPP  
Bob Oller, SCWA  
Chris Sommers, CEP Mercury Work Group  
Geoff Brosseau, BASMAA  
Tom Mumley, SFBRWQCB  
Dyan Whyte, SFBRWQCB  
Ron Gervason, SFBRWQCB  
Bruce Wolfe, SFBRWQCB  
Dale Bowyer, SFBRWQCB  
Andy Gunther, Clean Estuary Partnership

**Attachment 1:**

*Draft* preliminary table to clarify the proposed NPDES permit requirements for Phase 1 urban runoff programs related to the proposed mercury TMDL targets (##-## = dates to be determined)

Aspect of adaptive implementation plan	Proposed urban runoff program actions	Reporting format and target date
<b>1. Take immediate actions to reduce mercury discharges (i.e., early implementation)</b>	A. Increase recycling of fluorescent bulbs & other products containing mercury, as appropriate (Adopt agency policies, promote outreach, coordinate with HHW, other partners and UWR timeline for full implementation in FY ##-##)	Provide format to report ongoing activities as part of annual reports, starting with reports for FY ##-##
	B. Regionally plan and implement pilot projects designed to evaluate the feasibility and effectiveness of approaches to urban runoff mercury controls (e.g., CEP Urban Runoff Implementation Actions Feasibility Study). Include pilot investigations at sites known to have relatively elevated levels of mercury in sediments (potential "low hanging fruit"). Include other pollutants of concern in studies, as appropriate.	Coordinate planning and design of pilot projects based on findings of feasibility study currently approved by CEP. Start pilot project implementation in FY ##-##
	C. Develop, implement, and/or update a mercury control program	Update existing mercury reduction plans by FY ##-##, thereafter review at 2 year intervals and update if needed and feasible.
<b>2a. Monitor immediate actions</b>	A. Compliance reporting for early implementation actions: <ul style="list-style-type: none"> <li>o Develop approaches to estimate and report new mercury loads avoided (considering annual rainfall)—coordinate with pilot feasibility studies</li> <li>o Incorporate estimates in annual reports</li> </ul>	Develop approach & incorporate estimates into FY ##-## annual reports. Preliminary summary report FY ##-## with 2-3-year average; review 5-year averages and rainfall at 2-3 year intervals.

	B. Analyze pilot implementation studies and recommend modifications or rankings for actions in "toolkit"	Progress report via BASMAA & CEP FY ##-##
<b>2b. Monitor progress towards targets</b>	A. Develop monitoring strategy through regional programs (e.g. CEP/RMP)	Report participation in annual reports
	B. Support monitoring towards targets, coordinated via CEP, RMP or similar stakeholder partnership	Incorporate appropriate activities in program monitoring plans after development of regional consensus on approach
<b>3. Refine and address management questions</b>	A. Participate in regional programs (e.g., CEP and RMP) and support studies on priority management questions (e.g., bioavailability, fate/transport/uptake processes in the Bay, etc.). Support review/evaluation of improved information from studies carried out or tracked through regional programs.	Report participation in annual reports
	B. Coordinate with regional programs (e.g., CEP and RMP) and other stakeholder groups to test and refine assumptions used for source assessment and allocations for urban runoff and related sources (e.g., air deposition, non-urban runoff)	Report participation in annual reports
<b>4. Refine mercury control program through process of adaptive implementation</b>	Incorporate new information into mercury control program gained from: <ul style="list-style-type: none"> <li>• Pilot implementation studies</li> <li>• Studies focused on priority management questions</li> <li>• Refined conceptual models</li> </ul>	Incorporate into mercury reduction plans by FY ##-##, at 5 year intervals thereafter

Alameda Countywide  
Clean Water Program

Contra Costa  
Clean Water Program

Fairfield-Subson  
Urban Runoff  
Management Program

Marin County  
Stormwater Pollution  
Prevention Program

San Mateo Countywide  
Stormwater Pollution  
Prevention Program

Santa Clara Valley  
Urban Runoff Pollution  
Prevention Program

Vallejo  
Sanitation and Flood  
Control District



B A S M A A

September 17, 2003

Richard Looker  
California Regional Water Quality Control Board  
San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

**Re: Mercury in San Francisco Bay Total Maximum Daily Load (TMDL)  
draft Basin Plan Amendment (BPA)**

Dear Richard:

This letter is submitted on behalf of the Bay Area Stormwater Management Agencies Association (BASMAA) in response to the invitation to submit comments on the draft Basin Plan Amendment language for Urban Runoff, which we received on September 3, 2003.

BASMAA staff and member agency representatives would like to take this opportunity to thank you for the opportunity to meet on July 30 to discuss our comments on the Project Report and to receive some initial responses to our comments from you and other Regional Board TMDL and permitting staff. We appreciate your willingness to share with us this draft Basin Plan Amendment language and the opportunity to comment on it, despite the short schedule you are trying to meet. Please understand that two weeks is insufficient time to vet our comments with the more than 90 agencies represented by BASMAA so our comments should be considered preliminary staff comments and not necessarily comprehensive.

Overall, BASMAA is looking for sufficient flexibility in the Basin Plan language so that urban runoff programs can demonstrate reasonable progress toward meeting the allocations through reasonable efforts designed to address controllable water quality factors. BASMAA also expects wasteload allocations to be technically feasible and reasonably assured of being implemented in a reasonable period of time.

Our specific comments are provided in the attached mark-up of the preliminary draft language. We hope you find these preliminary comments and suggested improvements to the draft Basin Plan Amendment language for Urban Runoff useful. We look forward to reviewing the next draft as well as the draft Staff Report when they are released for peer review. Please contact me at (510) 622-2326 if you have any questions regarding the comments or suggested changes.

Bay Area

Stormwater Management

Agencies Association

1515 Clay Street

Suite 1400

Oakland, CA 94612

510.622.2326

www.basmaa.org

Sincerely,

*ORIGINAL SIGNED BY*

Geoff Brosseau, Executive Director

enclosure: Comments – Preliminary urban runoff language – draft BPA

## Preliminary Draft Urban Runoff Language

### Allocations

Tables 4.x through 4.y present load and wasteload allocations for San Francisco Bay's mercury sources. The allocations are expressed as annual mercury loads in kilograms per year (kg /yr). Table 4.x(1) presents load and wasteload allocations by source category along with current estimated yearly loads. Tables 4.x(2) through 4.x(4) contain load and wasteload allocations for individual urban runoff and wastewater discharges to San Francisco Bay. When summed, the individual allocations equal the category totals for urban runoff and wastewater shown in Table 4.x(1). Allocations for sources for which most of the mercury is attached to sediment were computed by applying the sediment target to the estimated sediment load from that source. Thus, the allocation may be achieved through a demonstration that sediment entering the Bay contains a concentration of mercury equal to or lower than the sediment target.

Currently, mercury inputs to the Bay total about 1200 kg per year. San Francisco Bay loses approximately 1700 kg of mercury each year as a result of transport through the Golden Gate, the net result of dredging and disposal, and evaporation. These losses will likely change over time as changes occur in mercury sediment concentrations in the Bay as the TMDL is implemented and inputs are reduced.

**TABLE 4.x(1): Load and Wasteload Allocations By Source Category**

Source	Current Mercury Load (kg/yr)	Allocation (kg/yr)
Bed Erosion	460	220
Central Valley Watershed	440	330
Urban Runoff	160	82
Guadalupe River Watershed (mining legacy)	92 <sup>1</sup>	2
Atmospheric Deposition	27	27
Non-Urban Storm Water Runoff	25	25
Wastewater (municipal and industrial)	19	19

<sup>1</sup> This load does not account for mercury captured in sediment removal programs conducted in the watershed.

**TABLE 4.x(2): Wasteload Allocations  
for Individual Urban Runoff Discharges**

<b>Urban Runoff Program</b>	<b>Percent of Program Area Population</b>	<b>Allocation (kg/yr)</b>	<b>Load Reduction Required (kg/yr)</b>
Santa Clara County	27.42	22.481	21.384
Alameda County	24.68	20.238	19.250
Contra Costa County	13.53	11.095	10.554
San Mateo County	10.22	8.384	7.975
Vallejo	2.00	1.637	1.557
Fairfield-Suisun	1.92	1.575	1.498
Sonoma County	0.87	0.715	0.680
Napa County	0.44	0.363	0.346
Marin County	0.98	0.804	0.765
Solano County	0.98	0.803	0.764
San Francisco	10.71	8.779	8.351 <sup>a</sup>
American Canyon	0.17	0.137	0.130
Belvedere	0.04	0.030	0.028
Benicia	0.46	0.377	0.358
Calistoga	0.09	0.073	0.069
Corte Madera	0.16	0.128	0.121
Fairfax	0.13	0.103	0.098
Larkspur	0.21	0.168	0.160
Mill Valley	0.23	0.191	0.181
Napa	1.24	1.018	0.968
Novato	0.81	0.668	0.635
Petaluma	0.93	0.765	0.728
Ross	0.04	0.033	0.031
San Anselmo	0.21	0.174	0.165
San Rafael	0.96	0.786	0.748
Sausalito	0.13	0.103	0.098
Sonoma	0.16	0.128	0.122
Saint Helena	0.10	0.083	0.079
Tiburon	0.15	0.122	0.116
Yountville	0.05	0.041	0.039
<b>Total</b>	<b>100</b>	<b>82<sup>b</sup></b>	<b>78<sup>b</sup></b>

<sup>a</sup> This load reduction does not account for treatment provided by San Francisco's combined sewer system.

<sup>b</sup> These totals may differ slightly from the column sum due to digit truncation from rounding to three decimal places.

## Implementation Plan

### *Urban Runoff*

The allocations shown in Table 4-x(2) will be implemented through the NPDES permits issued to urban runoff management agencies and the California Department of Transportation (Caltrans) or other regulatory mechanisms. The permits will require the adoption and implementation of best management practices (BMPs) and other urban runoff management measures/programs designed to address the wasteload allocations and load reductions derived from the allocations to the maximum extent practicable over time. The goal for this group shall be to collectively address and make reasonable further progress in achieving the allocation to the maximum extent practicable. As a way to identify, establish and assess progress towards the interim milestone of 120 kg/yr (halfway between the current load and the allocation), during the first 10 years, NPDES-permitted entities will demonstrate reasonable and measurable progress through the implementation of the dischargers' mercury reduction plans.

The following requirements have been or will be incorporated through NPDES urban runoff program permits or other regulatory mechanisms for entities conducting comprehensive control programs (i.e., Phase I storm water programs). Similar requirements will be put in place five years from the effective date of the amendment adding this section to the Basin Plan for municipalities conducting baseline programs (i.e., Phase II storm water programs).

- i) Evaluate and report on the spatial extent, magnitude and cause of pollution, for selected case study locations where elevated mercury concentrations exist;
- ii) Develop and implement a mercury reduction program for controllable sources that contribute significant loadings;
- iii) Develop and implement a mechanism to attempt to quantify either mercury loads or loads reduced/avoided through treatment, source control and /or other management efforts;
- iv) Support studies aimed at better understanding mercury fate, transport, biological uptake and/or potential discharge/loading reduction techniques/opportunities from all sources in San Francisco Bay; and
- v) Prepare an annual report that documents compliance with the above and attempts, to the maximum extent practicable, to estimate either mercury loads or loads avoided through ongoing pollution prevention and control activities.

Each urban runoff discharger allocation implicitly includes discharges from industrial and construction sites within each municipality. Municipalities have a responsibility to oversee these sources. However, if it is determined that such a source is substantially contributing to mercury loads to the Bay and is outside the jurisdiction or authority of a municipality or requires additional regulatory control and/or oversight, the Regional

Board will consider adopting additional requirements (e.g., individual NPDES permits, WDRs, CAOs, CDOs, etc.) for the industrial/construction source.

Within the jurisdiction of each urban runoff entity, Caltrans manages and is responsible for discharges associated with California highways and related facilities. The percentage of each urban runoff management agencies' mercury load for which Caltrans shall be responsible, and the reductions to be required from Caltrans runoff have not yet been determined. As an initial measure, each urban runoff entity may identify a reasonable allocation of load reduction expected to be addressed by Caltrans within their jurisdiction and provide the basis for such an estimate. In addition, to facilitate achievement of these estimated load reductions, the following elements shall be incorporated into the Caltrans' regional work plan for the San Francisco region:

- A) Quantify mercury loads associated with construction, maintenance, and use/operation of California highways and other facilities under Caltrans' jurisdiction;
- B) Develop and implement a system to control and reduce/eliminate such mercury loads and identify progress and load reductions expected to be achieved within 10 years; and
- C) Prepare an annual report that documents mercury loads or loads reduced or eliminated and ongoing source control activities.

Urban storm water management agencies and Caltrans shall, at least every five years, assess their progress in addressing, to the maximum extent practicable, the allocations shown in Table 4-x(2) using one of the methods listed below.

- 1. Provide a quantified estimate of the five-year annual average mercury load avoided by implementing pollution prevention, source control, and treatment efforts and the basis for the estimate. The Regional Board may recognize loads avoided resulting from activities implemented after 2001 as counting toward the load reductions consistent with the wasteload allocation.
- 2. Provide a quantified estimate of the five-year annual average mercury load using data on flow and mercury concentrations in water and suspended particulate matter.
- 3. Show through studies, models, and/or monitoring data that the mercury concentration of suspended sediment that best represents sediment discharged from program areas is below the sediment target.

#### ***Adaptive Implementation of the Mercury TMDL***

Within five years from the effective date of the amendment adding this section to the Basin Plan and every five years thereafter until the TMDL targets are achieved, the Regional Board will review the San Francisco Bay mercury TMDL to evaluate new information relevant to the mercury TMDL from monitoring, special studies, and the scientific literature. The reviews will be coordinated through the Regional Board's water quality Basin Planning Program and provide opportunities for stakeholder participation.

Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan through appropriate procedures during these reviews. It is recommended that the following focusing questions be used to conduct the reviews. Additional focusing questions will be developed in collaboration with stakeholders during each review.

1. Is the Bay progressing toward TMDL targets as expected? If it is unclear whether there is progress, how should efforts be modified to detect trends? If there has not been progress, how might the implementation actions or allocations be modified?
2. What has been learned about the loads for the various source categories and how have these loads changed over time?
3. Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, load allocations, or implementation actions? If so, how might the TMDL be modified?

The load and wasteload allocations were determined on the basis of currently available data, which is limited and are designed to achieve water quality standards. It is possible that a responsible entity, after exhausting all reasonably practicable remedies, may not achieve the required allocation and/or may need substantial additional time to make progress towards the ultimate allocation objective. In such a case, the discharger may prepare for Regional Board consideration and acceptance a detailed account of actions taken and the explicit rationale for why additional measures to control loads are either not practicable, will require more time, and/or would not result in meaningful load reductions. Such a petition may not be accepted unless the discharger can demonstrate that it has implemented practicable control measures and attempted to assess their effects on loads in good faith. If such a petition is prepared by the responsible entity and accepted by the Regional Board, the responsible entity will be deemed to be in compliance with Regional Board regulatory requirements relating to required allocations.

### **New Sources of Mercury**

As the TMDL is implemented, new sources of mercury may emerge either as the result of a new facility applying for a permit to discharge or as a result of a new source being discovered. The Regional Board will consider establishing a load or wasteload allocation for a new mercury source under the following circumstances:

- The load allocation from one or more existing sources of the same category (e.g., municipal wastewater) will be reduced by an amount equal to the new allocation; or
- The Regional Board finds that the magnitude of the new allocation is negligible compared to reductions in total annual mercury load from all sources that will have been realized at the time of consideration; or
- The allocation is for a previously unknown or unquantified discharge of mercury.

To: "Bill Johnson" <bjj@rb2.swrcb.ca.gov>  
From: Chris Sommers <csommers@eoainc.com>  
Subject: Draft Preliminary Urban Runoff Cost Estimates Re: Mercury  
Cc: adam olivieri <awo@eoainc.com>, arleen@acpwa.org, jon\_konnan@eoainc.com, fejarvis@eoainc.com  
Bcc:  
Attached:

Dear Bill,

As requested, here is our *preliminary draft review* of the cost of implementing the mercury TMDL by SCVURPPP. A portion of the rough cost estimates described below were originally included in the CEP's draft report for urban runoff implementation.

Please understand that two weeks is insufficient time to develop and provide accurate cost estimates. These estimates contained in this document should be considered very draft preliminary rough cost estimates from program staff and are not necessarily comprehensive.

Additionally, it is important to note that this preliminary draft review of cost estimates presented here are based on the following assumption:

*The adopted Basin Plan Amendment (BPA) language and associated permit conditions for urban runoff will look very similar to the revised preliminary draft BPA language for urban runoff (revised BPA language) submitted to Richard Looker (SFB RWQCB) by BASMAA on September 17, 2003.*

The 5 major requirements as described in the revised BPA language are:

- i) Evaluate and report on the spatial extent, magnitude and cause of pollution, for selected case study locations where elevated mercury concentrations exist;
- ii) Develop and implement a mercury reduction program for controllable sources that contribute significant loadings;
- iii) Develop and implement a mechanism to attempt to quantify either mercury loads or loads reduced/avoided through treatment, source control and /or other management efforts;
- iv) Support studies aimed at better understanding mercury fate, transport, biological uptake and/or potential discharge/loading reduction techniques/opportunities from all sources in San Francisco Bay; and
- v) Prepare an annual report that documents compliance with the above and attempts, to the maximum extent practicable, to estimate either mercury loads or loads avoided through ongoing pollution prevention and control activities.

To be consistent, I have broken out the estimated costs for complying with each requirement. It is important to note that only the costs associated with complying with requirement ii (as presented above) were included in the estimates presented in the CEP document. The additional costs related to complying with requirements i, iii, iv and v (as presented above) are included in our draft estimates below. All draft estimated costs are based on anticipated implementation by the SCVURPPP, not all bay area urban runoff management programs.

**Please note:** Total costs of implementing source control programs or treatment controls are not

included in these draft estimates. For example, the costs of developing outreach, collecting, storing, transporting, and disposing of florescent light bulbs are not included in these estimates. The costs of conducting activities such as these are believed to be substantially greater (10x) than the draft estimates presented here. Additionally, economies of scale and SCVURPPP's experience with the NPDES program may underestimate the true cost to newer and / or smaller programs.

#### **Preliminary Draft Cost Estimates:**

The following preliminary draft cost estimates are based on best professional judgment and should be considered rough preliminary estimates. Costs are broken down into four categories: 1) Direct Costs cost of hiring a consultant (including program staff) to conduct a study or implement/develop/oversee a program; 2) Indirect Costs based on the time co-permittee staff will spend on complying with a specific requirement; 3) Initial Costs the one time costs of developing/implementing a program or conducting an activity; 4) Annual Costs yearly costs of complying with a requirement.

**Requirement i :** *Evaluate and report on the spatial extent, magnitude and cause of pollution, for selected case study locations where elevated mercury concentrations exist*

This requirement is related to conducting case studies to further characterize areas where elevated concentrations/loads of mercury have been found. Draft direct and indirect costs are estimated to initially be roughly **\$10,000 each**. Additional annual indirect and direct costs associated with this requirement are estimated to be roughly **\$50,000 and \$20,000**, respectively.

**Requirement ii :** *Develop and implement a mercury reduction program for controllable sources that contribute significant loadings*

Estimated costs to implement this requirement are based on costs presented in the CEP's draft report for urban runoff implementation. Implementing a mercury pollution prevention program proceeds in two steps:

1) Set up the program. After developing a pollution prevention plan, this step primarily involves educating the co-permittees by getting individual stormwater managers to understand the need for the pollution prevention program and agree to participate. Direct costs to the SCVURPPP to set up the mercury pollution prevention program and perform the initial outreach was **\$25,000 initially**. Indirect costs to the SCVURPPP co-permittees to set up the program was approximately **\$120,000 initially**.

2) Implement the program. This step involves development of policies, guidelines, and model ordinances. The SCVURPPP has allotted **\$60,000 initially** as the direct cost for program implementation. In addition to direct costs to the Program, indirect costs are incurred by co-permittees through the use of their own staff time. We estimate that the implementation of the pollution prevention program costs SCVURPPP co-permittees **\$120,000 initially** and will cost an additional **\$240,000 annually**.

**Requirement iii:** *Develop and implement a mechanism to attempt to quantify either mercury loads or loads reduced/avoided through treatment, source control and /or other management*

efforts

The following estimate is based on quantifying mercury loads avoided/reduced, rather than mercury loads. The direct startup cost estimate for developing a load avoided quantification method is estimated to be roughly **\$100,000 initially**. This estimate is based on tasks such as the review/documentation of all current and potential BMPs implemented by SCVURPPP and the development of a tracking method. Implementation of the method will require staff training and ongoing support and documentation of loads avoided and new BMPs implemented. The ongoing indirect implementation cost is estimated to be roughly **\$200,000 annually**

It is important to note that if environmental monitoring is required to quantify loads, it is highly probable that cost would substantially increase.

**Requirement iv:** *Support studies aimed at better understanding mercury fate, transport, biological uptake and/or potential discharge/loading reduction techniques/opportunities from all sources in San Francisco Bay*

This direct cost estimate is based on SCVRUPPPs current contribution to the CEP. SCVURPPP contributes roughly \$100,000 to the CEP annually (not including program/co-permittee staff time). If approximately 20% of the CEP contribution is associated with funding mercury-related studies, plus the additional program staff time to participate in CEP mercury-related activities, the estimated direct cost is expected to be **\$40,000 annually**. The indirect costs are estimated to be roughly **\$20,000 annually**, based on the review of documents and coordination with Program staff to remain apprised of the CEP mercury-related activities.

**Requirement v:** *Prepare an annual report that documents compliance with the above and attempts, to the maximum extent practicable, to estimate either mercury loads or loads avoided through ongoing pollution prevention and control activities.*

The direct cost of preparing an annual reporting format is estimated to be **\$10,000 initially (direct cost)**. Preparation of reports annually by program and co-permittee staff that are intended to document mercury pollution prevention activities and loads avoided is estimated to cost roughly **\$50,000 annually** in direct costs and **\$100,000 annually** in indirect costs.

### Summary

Preliminary Draft Rough Estimated Costs for SCVURPPP to Comply with the Mercury TMDL .

Requirement	Direct Costs	Indirect Costs
i.	Evaluate and Report on Hg Sites \$ 10,000 (initial)	\$ 10,000 (initial)
		\$ 50,000 (annual) \$ 20,000 (annual)
ii.	Mercury Pollution Prevention Plan	
a.	Plan Development	\$ 25,000 (initial) \$ 120,000 (initial)
b.	Plan Implementation (initial)	\$ 60,000 (initial) \$ 120,000
c.	Plan Implementation (annual)	\$ 240,000

iii. Mechanism to quantify loads avoided	\$100,000 (initial)	\$ 200,000 (annual)
iv. Bay Scientific Study Support	\$ 40,000 (annual)	\$ 20,000 (annual)
v. Annual Reporting	\$ 10,000 (initial)	
	\$ 50,000 (annual)	\$ 100,000 (annual)
<b>Totals:</b>	<b>\$ 205,000 (initial)</b>	<b>\$ 250,000 (initial)</b>
	<b>\$ 140,000 (annual)</b>	<b>\$ 580,000 (annual)</b>

**Population of Santa Clara County 1,700,000 (approx.)**

**Per capita initial costs \$ 0.33**

**Per capita annual costs \$ 0.42**

Please let me know if you have questions.

Chris Sommers  
Senior Scientist  
Eisenberg, Olivieri & Associates Inc. (EOA)  
1410 Jackson Street  
Oakland, CA 94612  
csommers@eoainc.com  
(510) 832-2852  
(510) 832-2856 (fax)

At 09:30 AM 9/18/03 -0700, you wrote:

Two weeks ago I requested a quick "confirm or deny" on the costs estimated in the CEP report (see attached). If I don't hear from you by early this afternoon, I'll just work with what I have.

Bill Johnson  
California Regional Water Quality Control Board  
San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612  
(510) 622-2354  
bjj@rb2.swrcb.ca.gov Date: Wed, 10 Sep 2003 18:31:36 -0700  
From: "Bill Johnson" <bjj@rb2.swrcb.ca.gov>  
Cc: "Dyan Whyte" <DCW@rb2.swrcb.ca.gov>,  
"Richard Looker" <Rel@rb2.swrcb.ca.gov>  
Subject: Fwd: Urban Runoff Costs Re: Mercury  
Mime-Version: 1.0  
Content-Type: multipart/mixed; boundary="=\_37696CD4.C3A25C39"

Since I haven't heard from you yet, I was just wondering whether you think this is something you could look into this week. I'm just looking for a quick "confirm or deny" thing, and I know the costs addressed here

do not include many activities SW programs may find themselves doing pursuant to the Hg TMDL. I'm just taking one thing at a time at this point.

Bill Johnson  
California Regional Water Quality Control Board  
San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612  
(510) 622-2354  
bjj@rb2.swrcb.ca.gov Date: Thu, 04 Sep 2003 15:32:24 -0700  
From: "Bill Johnson" <bjj@rb2.swrcb.ca.gov>  
Cc: "Dyan Whyte" <DCW@rb2.swrcb.ca.gov>,  
"Richard Looker" <Rel@rb2.swrcb.ca.gov>  
Subject: Urban Runoff Costs Re: Mercury  
Mime-Version: 1.0  
Content-Type: text/plain; charset=US-ASCII  
Content-Transfer-Encoding: 7bit  
Content-Disposition: inline

Hi Adam / Chris:

I'm pulling together whatever information I can find related to the costs of implementing the mercury TMDL. The CEP's draft report for urban runoff implementation includes some rough cost data. Since Khalil Abu-saba says the source of the information in the AMS report is EOA, I thought it might be wise to go directly to the source of the information and request confirmation. Would you mind reviewing this over the next few days and getting back to us next week with a response that says (1) yeah, this looks about right; (2) it's not quite right, but here's a fix; or (3) we've got better information, and here it is? Thanks for your help. The text from the CEP report is copied below.

#### **COSTS TO DEVELOP AND IMPLEMENT A MERCURY POLLUTION PREVENTION PROGRAM**

Implementing a mercury pollution prevention program proceeds in three steps:

- 1) Set up the program. After developing a pollution prevention plan (Appendix A), this step primarily involves educating the copermittees by getting individual stormwater managers to understand the need for the pollution prevention program and agree to participate. Direct costs to the SCVURPPP to set up the mercury pollution prevention program and perform the initial outreach was \$25,000.
- 2) Implement the program. This step involves development of policies, guidelines, and model ordinances, and training copermittee staff, as well as tracking and reporting the success of program implementation.

The SCVURPPP has allotted \$60,000 as the direct cost for program implementation.

In addition to direct costs to an urban runoff program, indirect costs are incurred by municipal copermittees through the use of their staff time. The SCVURPPP estimates that program development and implementation required 1/12 of a person year (160 hours) from each copermittee as a one-time cost, and will require an additional 160 hours / copermittee as an annual ongoing cost. Valuating staff time at \$100 an hour, this suggests that development and implementation of the pollution prevention program cost SCVURPPP copermittees \$240,000 initially and will cost an additional \$240,000 annually.

3) Monitor responses. A monitoring approach for mercury in Bay Area watersheds has been established by the Bay Area Stormwater Management Agencies Association (BASMAAA) to characterize mercury concentrations in sediments of urban and non-urban watersheds. This approach helps estimate mercury loads based on estimates of sediment discharged from urban and non-urban drainages. The total cost of the monitoring included costs for other pollutants of concern (e.g., PCBs, chlorinated pesticides). The SCVURPPP estimates that mercury monitoring costs amounted to \$50,000 for one year, including the cost of collecting samples, analyzing them for total mercury and grain size, and reporting the data. The response time of urban watersheds to implementation of pollution prevention measures is on the order of years to decades, so this type of monitoring should take place once every permit cycle (five years). Therefore, as an ongoing commitment, monitoring costs for a mercury pollution prevention plan are expected to amount to \$10,000 per year.

The total costs to develop and implement a mercury pollution prevention program consistent with the fulfillment of provision C.9.c in the SCVURPPP permit are summarized in Table 1, along with costs extrapolated to a population of 6.5 million. Although current NPDES stormwater programs do not currently cover that many people, 6.5 million is a reasonable upper estimate for the number of people affected once phase-II stormwater permits are issued to smaller municipalities. Based on these projections, the fiscal impact of mercury TMDL implementation in urban runoff programs is expected to be approximately \$1.2 million as a one-time cost and an additional \$1 million annually. Most of this cost is in the form of staff time for municipal workers (indirect costs).

TABLE 1: Estimated cost to develop and implement mercury pollution prevention plans for 6.5 million people, based on costs to the SCVURPPP. Direct costs refer to contracts, whereas indirect costs refer to city staff time valuated at \$100 / hour.

Start-up costs	Direct Costs	Indirect
Costs		

Plan Development (start-up)	\$ 25,000	\$
120,000		
Plan Implementation (start-up)	\$ 60,000	\$ 120,000
Plan Implementation (ongoing)		\$ 240,000
Monitoring	\$ 10,000	

Population of Santa Clara County	1,700,000
Per capita startup costs	\$ 0.19
Per capita ongoing costs	\$ 0.15

Startup costs for entire Bay Area	\$ 1,242,647
Ongoing costs for entire Bay Area	\$ 955,882

Economies of scale and SCVURPPP's experience with the NPDES program may underestimate the true cost to newer and / or smaller programs.

Bill Johnson  
California Regional Water Quality Control Board  
San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612  
(510) 622-2354  
bjj@rb2.swrcb.ca.gov

## **Appendix B**

U.S. Geological Survey Open-File Report 2004-1192. Version 1.0.  
Deposition, Erosion, and Bathymetric Change in South San Francisco Bay: 1858-1983



# **Deposition, Erosion, and Bathymetric Change in South San Francisco Bay: 1858-1983**

By Amy C. Foxgrover<sup>1</sup>, Shawn A. Higgins<sup>1</sup>, Melissa K. Ingraca<sup>1</sup>, Bruce E. Jaffe<sup>1</sup>, and  
Richard E. Smith<sup>2</sup>

<sup>1</sup> US Geological Survey Pacific Science Center, Santa Cruz, CA

<sup>2</sup> US Geological Survey Water Resources Division, Menlo Park, CA

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imply endorsement by the U.S. Government

Open-File Report 2004-1192

**2004**  
**U.S. Department of the Interior**  
**U.S. Geological Survey**

**U.S. Department of the Interior**

Gale A. Norton, Secretary

**U.S. Geological Survey**

Charles G. Groat, Director

U.S. Geological Survey, Reston, Virginia 2004

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# Deposition, Erosion, and Bathymetric Change in South San Francisco Bay: 1858 - 1983

By Amy C. Foxgrover<sup>1</sup>, Shawn A. Higgins<sup>1</sup>, Melissa K. Ingraca<sup>1</sup>, Bruce E. Jaffe<sup>1</sup>, and Richard E. Smith<sup>2</sup>

<sup>1</sup> US Geological Survey Pacific Science Center, Santa Cruz, CA

<sup>2</sup> US Geological Survey Water Resources Division, Menlo Park, CA

## Abstract

Since the California Gold Rush of 1849, sediment deposition, erosion, and the bathymetry of South San Francisco Bay have been altered by both natural processes and human activities. Historical hydrographic surveys can be used to assess how this system has evolved over the past 150 years. The National Ocean Service (NOS) (formerly the United States Coast and Geodetic Survey (USCGS)), collected five hydrographic surveys of South San Francisco Bay from 1858 to 1983. Analysis of these surveys enables us to reconstruct the surface of the bay floor for each time period and quantify spatial and temporal changes in deposition, erosion, and bathymetry.

The creation of accurate bathymetric models involves many steps. Sounding data was obtained from the original USCGS and NOS hydrographic sheets and were supplemented with hand drawn depth contours. Shorelines and marsh areas were obtained from topographic sheets. The digitized soundings and shorelines were entered into a Geographic Information System (GIS), and georeferenced to a common horizontal datum. Using surface modeling software, bathymetric grids with a horizontal resolution of 50 m were developed for each of the five hydrographic surveys. Prior to conducting analyses of sediment deposition and erosion, we converted all of the grids to a common vertical datum and made adjustments to correct for land subsidence that occurred from 1934 to 1967. Deposition and erosion that occurred during consecutive periods was then computed by differencing the corrected grids. From these maps of deposition and erosion, we calculated volumes and rates of net sediment change in the bay.

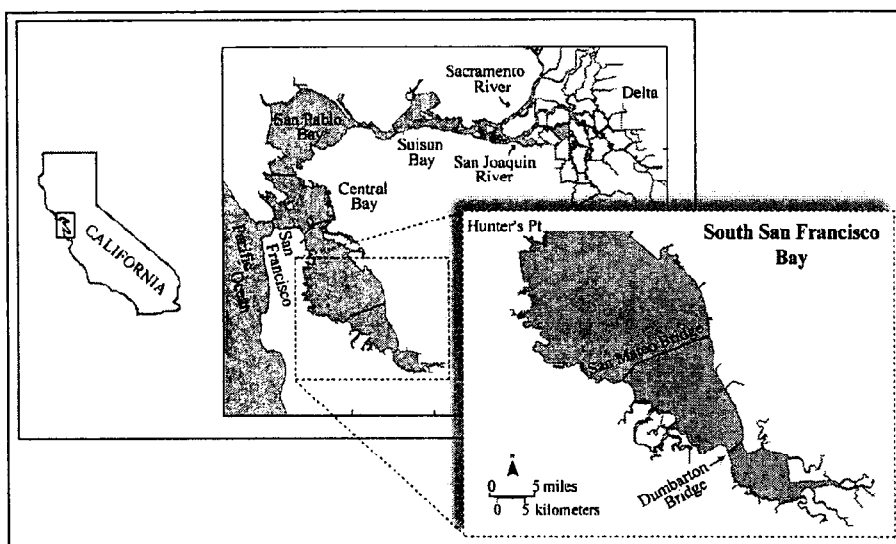
South San Francisco Bay has lost approximately  $90 \times 10^6 \text{ m}^3$  of sediment from 1858 to 1983; however within this timeframe there have been periods of both deposition and erosion. During the most recent period, from 1956 to 1983, sediment loss approached  $3 \times 10^6 \text{ m}^3/\text{yr}$ . One of the most striking changes that occurred from 1858 to 1983 was the conversion of more than 80% of the tidal marsh to salt ponds, agricultural, and urban areas. In addition, there has been a decline of approximately 40% in intertidal mud flat area. Restoration of these features will require a detailed understanding of the morphology and sediment sources of this complex system.

## Introduction

San Francisco Bay is centrally located along the California coast where the Sacramento and San Joaquin Rivers join to form the West Coast's largest estuary (Fig. 1). At the time that the first hydrographic survey was collected in South San Francisco Bay (1858), there were approximately 100,000 people living in the San Francisco Bay area; today it is home to nearly seven million. This rapid increase in population has placed a number of pressures upon the estuary. In addition to

natural processes such as sea-level rise, climatic influences on sediment delivery, and wind wave erosion, anthropogenic influences have altered patterns of sediment deposition and erosion throughout the estuary. Changes in bathymetry from 1858 to 1983 were documented by a series of hydrographic surveys. Utilizing Geographic Information Systems (GIS), we were able to conduct detailed analyses of these historical hydrographic surveys to assess not only spatial and temporal trends, but to quantify changes in net sediment volumes and rates over greater than decadal time scales.

This study is the third in a series that documents historical bathymetric change and the deposition and erosion of sediment in San Francisco Bay (Jaffe *et al.*, 1998; Cappiella *et al.*, 1999; United States Geological Survey San Francisco Bay Bathymetry Web Site). The study area for this report is South San Francisco Bay, which has been defined as the area South of Hunter's Point (Fig. 1). The National Ocean Service (NOS) (formerly the United States Coast and Geodetic Survey (USCGS)) collected five hydrographic surveys of South San Francisco Bay from 1858 to 1983 which serve as the basis for our models.



**Figure 1.** Location of study area.

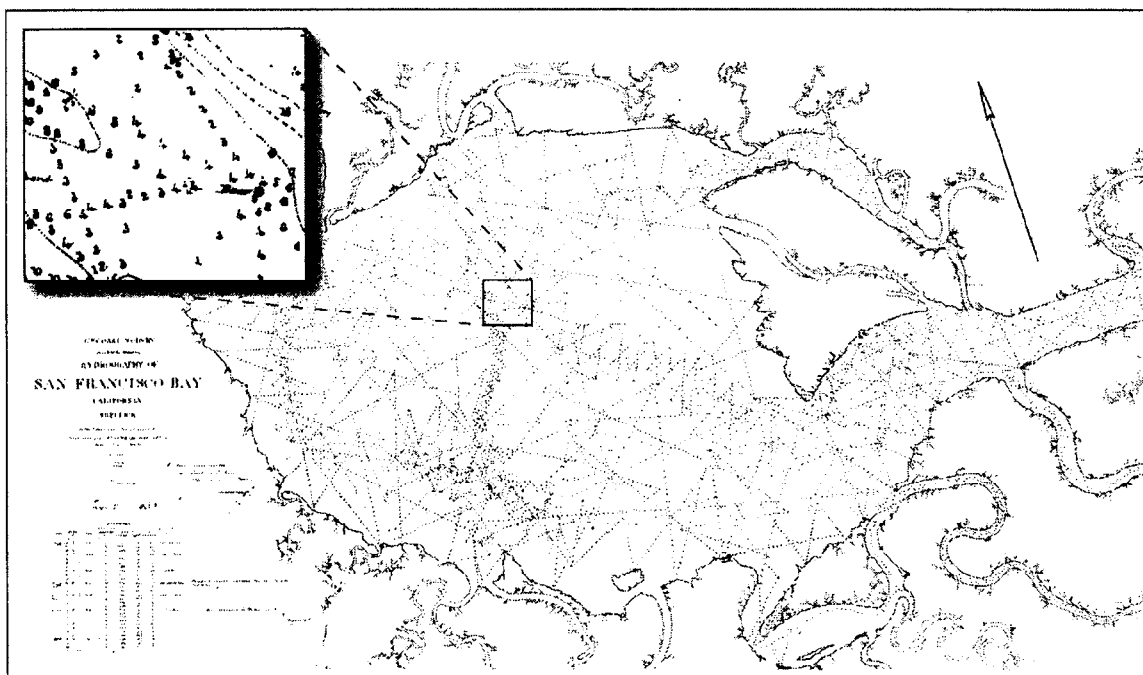
Compiling these data into a GIS was especially time consuming. Over 300,000 soundings, associated contours, and shorelines were analyzed to produce the bathymetric surfaces. However, analyses of long-term trends in the deposition and erosion of sediment provide insight into a dynamic system that is difficult to gain with short-term field studies. Using this data, we are able to investigate how the documented changes in bathymetry relate to changing biological communities, contaminant issues, and future development within this estuary.

## Methods and Data

Bathymetric soundings were obtained from the original USCGS and NOS hydrographic sheets (H-sheets) (Fig. 2). Bathymetric contours were digitized either from the H-sheets directly or based upon sounding values. Supplementary contours were manually added to the 1850's tidal flats where the original sounding values have been omitted from the H-sheets. An additional contour was added to all of the surveys, parallel to the shoreline, 20 m within the bay, to ensure realistic nearshore morphology in areas where soundings were not available (see contour section). Shoreline and marsh data were taken from topographic sheets (T-sheets). Once all of the

information was converted into a digital format, it was georeferenced, or assigned real world coordinates, and combined into a GIS. Continuous surface representations (bathymetric grids) with a horizontal resolution of 50 m were generated for each of the five hydrographic surveys using ArcInfo's TopoGrid module. TopoGrid is a modeling algorithm specifically designed to utilize both point and contour data to retain proper hydrogeomorphic properties. To ensure high-quality bathymetric grids, error checking techniques were applied at various stages of data processing.

Prior to conducting analyses of sediment deposition and erosion, we converted all of the grids to a common vertical datum to account for changes in sea level over the 125-year span of the surveys. In addition, we made adjustments to correct for land subsidence that occurred in the Santa Clara Valley from 1934 to 1967. Deposition and erosion that occurred within consecutive periods was then computed by differencing the corrected grids. The amount of sediment eroded and deposited between periods was calculated on a cell by cell basis to quantify net sediment volume change and rates of change throughout the bay.



**Figure 2.** Example of a historical 1858 H-sheet. The data distribution is typical of the 1850's hydrographic surveys.

## Bathymetric Time Series

### Input Data

#### 1850s

Soundings for the 1850's surveys were manually digitized from scanned images of H-sheets obtained from the Hydrographic Surveys Division of the NOS (Table 1). Hand-drawn depth contours were digitized based upon H-sheet data and supplemented manually as needed to maintain a consistent contour interval throughout all of the surveys (Fig. 3). The shorelines, as well as the

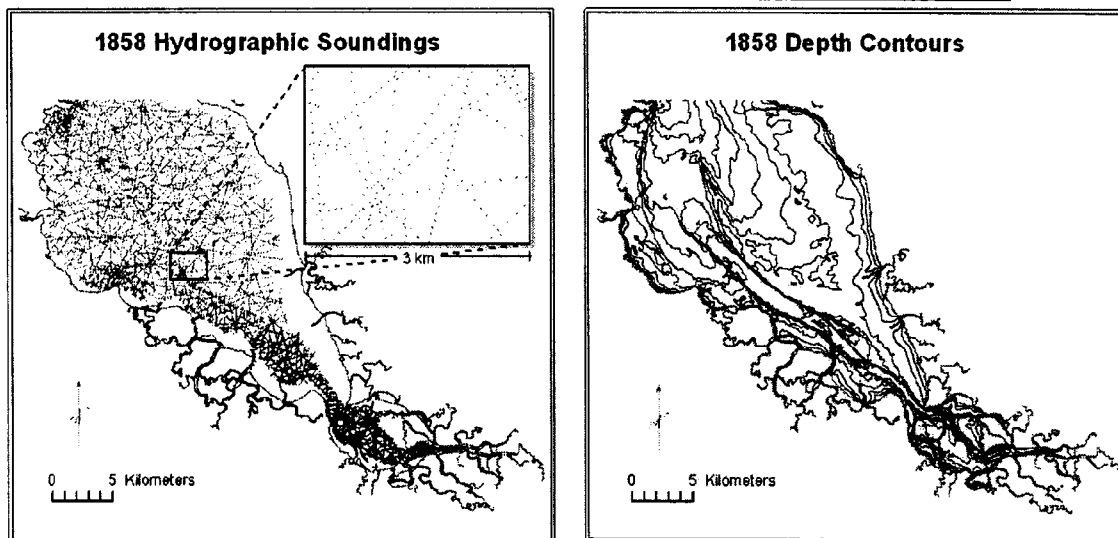
marsh boundaries for the 1850's surveys, were obtained digitally from the San Francisco Estuary Institute's (SFEI) EcoAtlas (1998).

It was common practice on the earliest H-sheets for all soundings above Mean Lower Low Water (MLLW) to be assigned a blanket value of zero (Dedrick, 1983). This was a result of USCGS plotting standards at that time and does not accurately reflect the slope of the tidal flats. To create a more realistic slope, we artificially generated contours at approximately  $\frac{1}{2}$  and  $\frac{1}{4}$  of the distance between the shoreline, represented by Mean High Water (MHW), and MLLW. These contours were assigned values of 25% and 50%, respectively; of Mean Tide Level (MTL) elevations (see contours section). All zero soundings between MLLW and MHW were removed from the gridding routine. This is a rough estimate of tidal flat slope based upon 1898 surveys in which soundings above MLLW were retained. Kent Dedrick and others with the CA State Lands Commission have replaced the zero values above MLLW with the reduced soundings derived from the original USCGS tidal observation books. It is our hope to incorporate these values into our work in the near future.

Due to the relatively sparse distribution of data in the 1850's surveys, it was necessary to add a limited number of supplementary soundings (based upon surrounding values) to narrow channels crossing the tidal flats in order to maintain channel connectivity through the mudflat.

**Table 1.** Table of 1850's H-sheets of South San Francisco Bay.

H-Sheet	Year	Scale	Soundings
H628	1857-58	1:20,000	9,898
H629	1857-58	1:10,000	2,250
H636	1857-58	1:10,000	6,373
H637	1858	1:10,000	1,003
H638	1858	1:10,000	512
			Total = 20,036



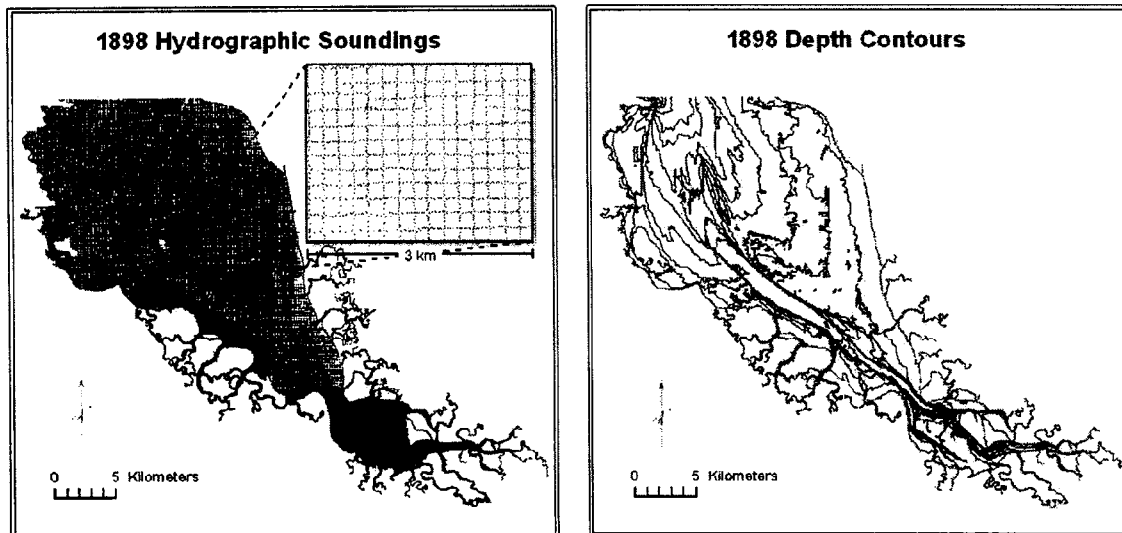
**Figure 3.** 1850's soundings and contours used for surface modeling.

## 1890s

Soundings for the 1890's surveys were manually digitized from scanned images of H-sheets obtained from the Hydrographic Surveys Division of the NOS (Table 2). Hand-drawn depth contours were digitized based upon H-sheet data and supplemented manually as needed to maintain a consistent contour interval throughout all of the surveys (Fig. 4). The shorelines and the marsh boundaries were digitized from scanned images of Topographic-sheets (T-sheets).

**Table 2.** Table of 1890's H-sheets of South San Francisco Bay.

H-Sheet	Year	Scale	Soundings
H2304	1897	1:20,000	10,839
H2315	1897	1:20,000	34,321
H2411	1898-99	1:20,000	16,206
H2412	1898	1:10,000	15,803
H2413	1898	1:10,000	5,418
H2414	1898	1:10,000	2,982
H2415	1898	1:10,000	13,830
			Total = 99,399



**Figure 4.** 1890's soundings and contours used for surface modeling.

## 1930s

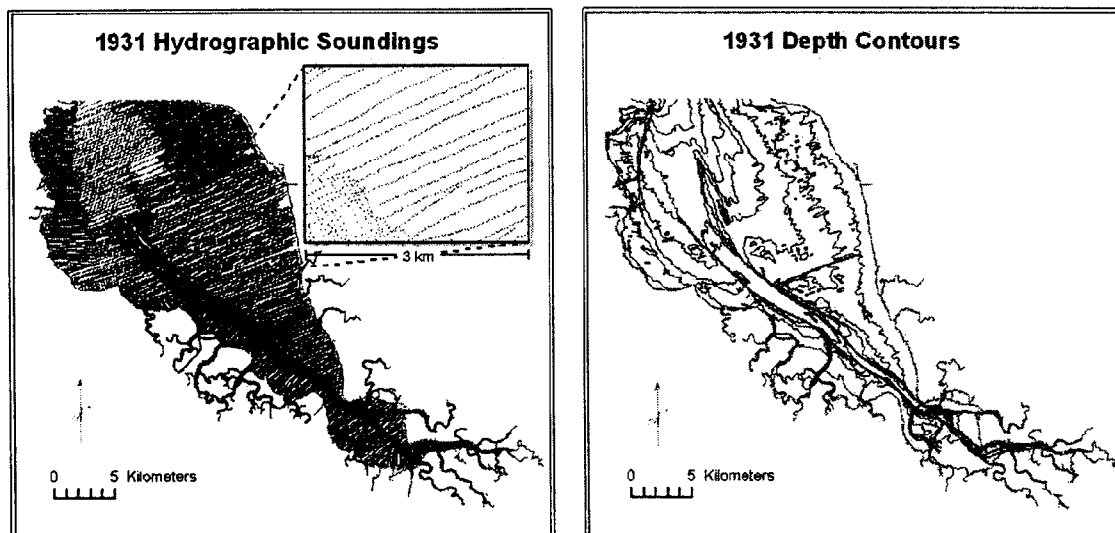
The majority of the 1930's depth soundings were obtained digitally from the National Geophysical Data Center's (NCDC) GEOPHYSICAL Data System (GEODAS) (1996) with the exception of H4137. Soundings from H4137 were manually digitized from a scanned image of the H-sheet obtained from the Hydrographic Surveys Division of the NOS (Table 3). Hand-drawn depth contours were digitized based upon depth soundings (Fig. 5). The shorelines for the 1931 surveys were obtained digitally from the National Geodetic Survey (NGS) NOAA Shoreline Data Explorer. The marsh extent was digitized from georeferenced, scanned images of T-sheets obtained from the NOAA National Ocean Service Coastal Services Center.

Although we label our bathymetric maps with a single year, hydrographic surveys customarily are conducted over the span of a few years. The year displayed on our maps is the year in which the majority of the surveys were conducted. There was an exceptional time lapse of

approximately ten years within the 1931 survey. The northernmost survey within the study area (H4137) was surveyed in 1919-20 while the remaining surveys were collected in 1931. There was a slight area of overlap between the H4137 (1919-20) and H5129 (1931) in the vicinity of San Bruno Shoal that indicated differences of one to three feet between sounding values. We did not feel justified in performing linear interpolations in an attempt to bring the data to a common date and rather decided to honor the original data. Overlapping soundings between the two time periods were removed, and rates of sediment volume change were calculated using separate regions to account for this disparity in time periods.

**Table 3.** Table of 1930's H-sheets of South San Francisco Bay.

H-Sheet	Year	Scale	Soundings
H4137	1919-20	1:20,000	23,509
H5129	1931	1:20,000	25,185
H5131	1931	1:10,000	10,313
H5133	1931	1:10,000	12,276
H5135	1931	1:10,000	8,409
H5139	1931	1:10,000	7,735
H5140	1931	1:10,000	5,024
			Total = 92,451



**Figure 5.** 1930's soundings and contours used for surface modeling.

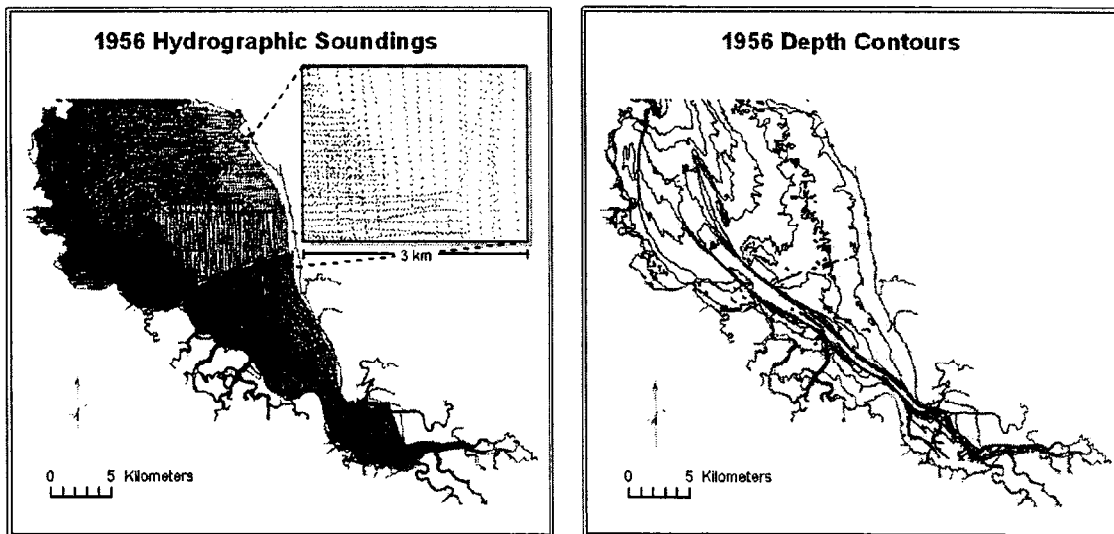
#### 1950s

Depth soundings for the 1950's surveys were obtained digitally from NGDC's GEODAS database (1996) (Table 4). Hand-drawn depth contours were digitized based upon H-sheet data and supplemented manually as needed to maintain a consistent contour interval throughout all of the surveys (Fig. 6). The shorelines for the 1950's surveys were digitized from H-sheets. The marsh boundaries were digitized from scanned, georeferenced images of T-sheets obtained from the NOAA National Ocean Service Coastal Services Center.

GEODAS soundings for H8025 (near Hunter's Point) were missing some soundings that existed on the original H-sheet; these soundings were manually digitized.

**Table 4.** Table of 1950's H-sheets of South San Francisco Bay.

H-Sheet	Year	Scale	Soundings
H8023	1954	1:5,000	7,651
H8024	1954	1:10,000	20,123
H8025	1954-55	1:10,000	13,137
H8026	1954-55	1:10,000	14,174
H8027	1955	1:20,000	12,900
H8210	1956	1:10,000	4,683
H8275	1956	1:10,000	15,733
H8281	1956	1:10,000	9,429
H8282	1956	1:10,000	2,918
			Total = 100,748



**Figure 6.** 1950's soundings and contours used for surface modeling.

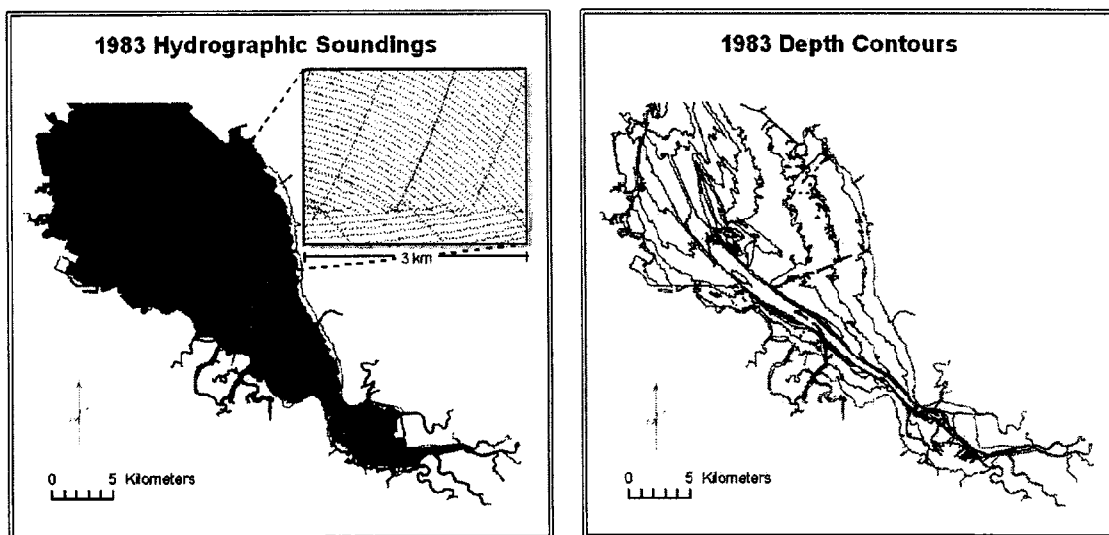
#### 1980s

Digital soundings for the 1980's surveys were obtained from NGDC's GEODAS database (1996) (Table 4). Hand-drawn depth contours were digitized based upon depth soundings (Fig. 7). The shorelines as well as the marsh boundaries were obtained digitally from SFEI's EcoAtlas (1998).

It was discovered that select soundings from H10132 (downloaded from GEODAS) were apparently assigned an incorrect depth code. Soundings above MLLW (intertidal soundings) appeared to be recorded in centimeters rather than decimeters. These points were selected and converted from centimeters to decimeters to match the rest of the data. There was an additional cluster of approximately 30 soundings within H10102 located near Redwood Creek whose values differed from their surrounding soundings by over an order of magnitude. No logical correction was evident, so these points were removed.

**Table 5.** Table of 1980's H-sheets of South San Francisco Bay.

H-Sheet	Year	Scale	Soundings
H9819	1979	1:5,000	19,645
H10102	1983-84	1:100,000?	12,600
H10158	1984-85	1:10,000	5,819
H9869	1980	1:10,000	12,726
H9872	1980	1:20,000	21,356
H9952	1981-82	1:10,000	22,439
H9984	1981-83	1:10,000	11,413
H10070	1982-83	1:10,000	12,227
H10132	1984-85	1:10,000	17,870
			Total = 136,095



**Figure 7.** 1980's soundings and contours used for surface modeling.

### Georeferencing

Georeferencing the early surveys was especially challenging because the 1850's hydrographic sheets contained no discernable coordinate information. The H-sheets were georeferenced using common shoreline features with SFEI's shoreline coverage. For each H-sheet several control points were placed along distinct shoreline features on the H-sheet that were also observable on the SFEI shoreline coverage. Coordinate information from the SFEI coverage was assigned to the control points and a best-fit transformation was performed to minimize error over the entire sheet.

The 1890's H-sheet and T-sheets contain graticules depicting longitude and latitude referenced to a localized datum. To determine the relationship of this local datum to the established North American Datum 1927 (NAD27), the sheets were registered using published coordinate values of four triangulation stations throughout the bay (Mitchell, 1936). Based upon

these coordinates a standard correction shift was calculated and applied to the graticule values on the published H-sheets and T-sheets.

Hydrographic data from the 1930's surveys were referenced to an earlier U.S. Standard Datum (soundings downloaded from the GEODAS database appeared to be incorrectly registered). We received the 1931 shoreline coverage and digital images of the corresponding topographic surveys from the NOAA National Ocean Service Coastal Services Center; georeferenced to UTM NAD83. Coordinate values from triangulation stations on the T-sheets were used to georeference the H-sheets. The digital GEODAS soundings were then adjusted to agree with the properly registered H-sheet.

H-sheets and T-sheets from the 1950's and 1980's surveys were properly referenced to NAD27 on the original maps.

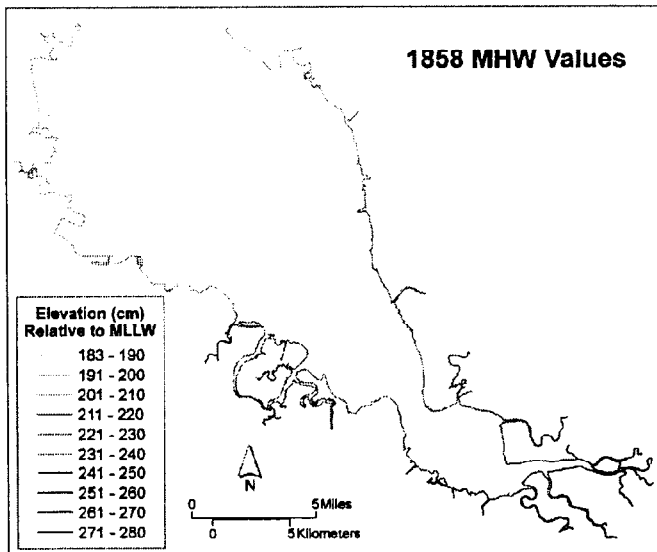
## Contours

Depth contours assist in defining the general morphology of the bathymetric grids and stabilize the model in areas of sparse soundings. Contours were digitized from H-sheets at MLLW, 3, 6, 12, 18, 24, 30, 36, 50, 60, 70, and 80 ft. Depth contours for surveys prior to 1930, and for the 1950's surveys were digitized from H-sheets and supplemented as needed to maintain a consistent contour interval throughout all of the surveys. Depth contours for the 1930's and 1980's surveys were added manually based upon sounding values. In general, depth contours were only drawn in areas supported by a minimum of three soundings.

In many areas there are gaps in excess of 150 m between the shallowest soundings and the shoreline. In order to best model the steep slope of the mudflat as it approaches the shoreline in areas where soundings do not exist within the first grid cell (50 m from shore) an additional contour has been placed parallel to the shoreline at a distance of 20 m within the bay and assigned an approximate value of MTL. The MTL values were derived from various tidal stations around the perimeter of the bay and interpolated between stations to assign a continuous elevation value to the shoreline buffer. This provides a means of modeling the steep slope of the nearshore morphology within the confines of a 50 m grid cell and may not be an accurate reflection of nearshore morphology.

## Shorelines

All of the shorelines used for this study were originally derived from T-sheets, and are defined as the MHW line. For modeling purposes it was necessary to assign an elevation to this boundary. Due to the large tidal range of South San Francisco Bay, MHW values vary significantly from north to south. In order to reflect this variation, MHW values were derived from various tidal stations around the perimeter of the bay and interpolated between stations to assign continuous elevation values to the shorelines (Fig. 8). It is important to note that while this assignment of shoreline elevations is sufficient for our modeling purposes, it is not intended to provide specific MHW values at any given location.



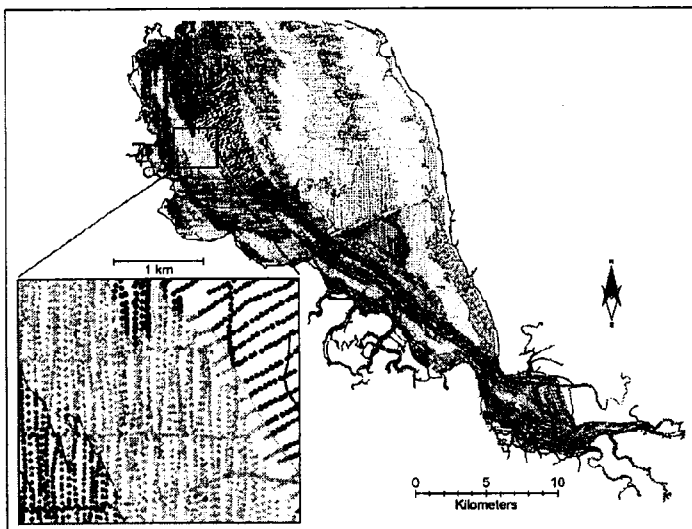
**Figure 8.** Mean High Water values assigned to shorelines.

### Surface Modeling

Once the data has been combined into a GIS, we used ArcInfo's TopoGrid module to generate a continuous surface representation (50 m horizontal resolution) of each bathymetric survey. TopoGrid is a gridding algorithm designed to utilize both sounding and contour data to generate a hydrologically correct Digital Elevation Model (DEM). TopoGrid uses an iterative finite difference interpolation technique in which the contours are initially used to build a generalized drainage model that is further refined using both soundings and contour values to determine elevation values at each cell. Each historical bathymetric survey is defined by over 160,000 grid cells. Bathymetry in tributary channels less than 150 m wide were excluded because they could not be accurately modeled at a resolution of 50 m.

### Error Checking

Error checking is an iterative procedure that took place at various stages of data processing. An initial round of error checking was conducted once all of the data has been combined into a GIS through visual inspection in ArcMap. Point data were classified by elevation in feet. Class boundaries are chosen to correspond with the contour interval (0 to 6, 7 to 12, 13 to 18, etc.). Contrasting colors were then used to shade the point data. Large errors (decimal point off, attribute typos, etc.) tend to stand out and can be detected in this way. Contours were also checked for agreement with the point data (e.g., all the red points should be on one side of the contour, all the blue points on the other) (Fig. 9).



**Figure 9.** Sample of visual error checking technique applied to both soundings and contours.

A secondary visual inspection was performed upon the first round of grid production. The bathymetric grid from each time series was hill-shaded to accentuate any abnormalities in the morphology of the bay floor. For example, erroneous soundings may appear as abnormal pits or mounds relative to the surrounding data. Erroneous soundings were either corrected or removed from the input data.

Errors were also evaluated statistically by comparing the value of each individual sounding to the cell value of the bathymetric grid at that specific location. The difference between soundings and corresponding grid cells is useful in identifying areas of error and also serves as a means for quantifying how well the surface represents the original point data (Table 6). The greatest differences in individual soundings and cell values occurred along the steep slope of the main channel where large gradients in bathymetry could not be resolved within a single 50 m grid cell.

**Table 6.** Table of grid bias, representing difference between sounding values and corresponding grid cells. This serves as a proxy for how well the surface represents the original sounding data.

Year	Frequency	Maximum		Minimum		Mean		Std. Deviation	
		(cm)	(ft)	(cm)	(ft)	(cm)	(ft)	(cm)	(ft)
1858	17,986	542	17.78	-707	-23.20	-8.6	-0.28	58.9	1.93
1898	87,273	617	20.24	-888	-29.13	-1.6	-0.05	39.2	1.29
1931	76,678	687	22.54	-890	-29.20	-1.9	-0.06	48.2	1.58
1956	77,397	654	21.46	-864	-28.35	-1.7	-0.06	48.2	1.58
1983	128,467	861	28.25	-748	-24.54	-0.3	-0.01	48.8	1.60

### Sediment Volume Change Analysis

Prior to conducting analyses of sediment deposition and erosion, some adjustments were made to the bathymetric grids. A vertical datum adjustment was applied to bring all of the surveys to a common vertical datum. It was also necessary to account for subsidence of the bay floor that occurred from 1934 to 1967. Once these adjustments were made, the corrected grids were differenced to reveal deposition and erosion that occurred during consecutive surveys.

## Vertical Datum Adjustment

The USCGS and NOS hydrographic surveys are relative to the MLLW vertical datum. MLLW is the average of the lower low water height of each tidal day observed at a given tidal station over the National Tidal Datum Epoch, a specific 19-year cycle (18.6 year tidal epoch rounded to a full year to minimize bias from seasonal variation). The MLLW tidal datum, therefore, varies depending upon the 19-year cycle used for measurement. Prior to generating sediment volume change calculations, all of the bathymetric grids were adjusted to a common vertical datum to account for changing survey datums accompanying fluctuations in sea level over the 125-year span of the surveys.

During the temporal span of this study (1856-1983), five tidal datum epochs were used for the tide station at San Francisco (Golden Gate). The 19-year cycle from 1960-78 was used to calculate MLLW values for the most recent (1983) hydrographic surveys in South San Francisco Bay. Earlier epochs used for San Francisco include: 1858-73, 1878-96, 1898-1916, 1924-42, and 1941-59. The epoch used as the vertical datum reference for hydrographic surveys was presumed to be the 19-year cycle most recently preceding the date of the survey with the exception of the 1850's surveys for which there was no previously established tidal epoch.

Assuming no change in the bathymetry, an increase in the height of the tidal datum between surveys would result in a sounding from the later survey appearing deeper than a sounding at the same location from the earlier survey. An adjustment was derived to bring the historical surfaces to the same vertical datum used for the 1983 surface by differencing the staff reading for MLLW corresponding to a historical survey from the staff reading for MLLW during the 1960-78 epoch (Table 7). This method could not be used to adjust the 1858 surface because there was not a 19-year period of records at the time the survey was collected. We were unable to find any documentation stating how these early surveys were referenced to MLLW. We have assumed these surveys were referenced to MLLW over the time in which they were collected. Using monthly MLLW values for Fort Point tidal station, we averaged the MLLW values for January, February, and March of 1857 and 1858 which represent the months in which these surveys were collected.

**Table 7. Vertical Datum Adjustments.**

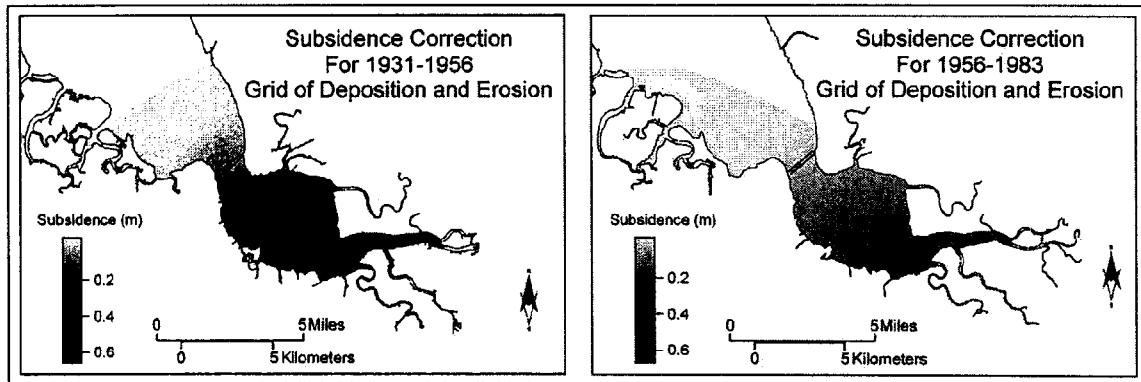
Survey Year	Presumed Epoch	MLLW on staff		Diff. from MLLW 1960-78	
		(m)	(ft)	(m)	(ft)
<sup>1</sup> 1858	N/A	1.62	5.31	0.14	0.46
1898	1878-96	1.72	5.65	0.04	0.12
1931	1898-16	1.67	5.49	0.09	0.28
1956	1924-42	1.71	5.61	0.05	0.16
1983	1960-78	1.76	5.77	---	---

<sup>1</sup>19 year tidal epoch not available for 1858 adjustment. MLLW value calculated by averaging monthly MLLW values over the time in which the surveys were collected.

## Subsidence Correction

In calculating net sediment volume change, it was necessary to account for land subsidence that occurred within the southern extent of South San Francisco Bay as a result of excessive ground water withdrawal from 1934 to 1967. Without correcting for subsidence, our grids of deposition and erosion would erroneously overestimate erosion during these time periods. The degree and spatial extent of subsidence was documented in Poland and Ireland (1988). The influence of subsidence extended from the Santa Clara Valley as far north as Ravenswood Point and ranged from 0 to 2.2 m (4 ft) within our study area from 1934 to 1967. The majority of subsidence was concentrated in San Jose, approximately 16.1 km (10 mi) south of our study area where subsidence reached a maximum of approximately 2.4 m (8 ft) from 1934 to 1967. Lines of equal subsidence

were digitized from two maps published by Poland and Ireland (1988); one depicting subsidence that occurred from 1934 to 1960 and a second map displaying subsidence from 1960 to 1967. These maps were used to generate a continuous surface of subsidence for each of the two time periods. Assuming linear rates for each map period, the proportion of subsidence that occurred from 1934 to 1956 was applied to the 1931 to 1956 grid of deposition and erosion, while the remaining proportion was applied to the 1956 to 1983 surface (Fig. 10). This subsidence correction accounts for approximately  $16 \times 10^6 \text{ m}^3$  or 24% of the net sediment volume change from 1931 to 1956 and  $9 \times 10^6 \text{ m}^3$  or 13% of the net change from 1956 to 1983.



**Figure 10.** Subsidence corrections applied to 1931 to 1956 and 1956 to 1983 grids of deposition and erosion.

Santa Clara Valley residents began to realize that the land was subsiding in the early 1900s and some limited leveling benchmarks were surveyed by the National Geodetic Survey beginning in 1912. It wasn't until 1933 that an extensive network was laid out to determine the extent, magnitude and rate of subsidence (Poland and Ireland, 1988). Since there were not reliable measurements of the subsidence that occurred prior to 1934 (although presumed to be minor), we were unable to account for subsidence that occurred during this time. As a result, it is possible that we have slightly underestimated deposition that occurred in the southernmost extent of the bay from 1898 to 1931. Significant subsidence has not occurred within the area since about 1969 (Ingebritsen and Jones, 1999).

### Sediment Volume Change Calculations

Once all of the adjustments have been made, maps of deposition and erosion were generated by differencing the corrected bathymetric grids. To improve comparability of sediment volumes for all surveys, maps of deposition and erosion were limited to only calculate values in tributary channels that contained bathymetric data for all five time periods. Multiplying the grids of deposition and erosion by surface area on a cell-by-cell basis resulted in volumetric measurements of sediment change.

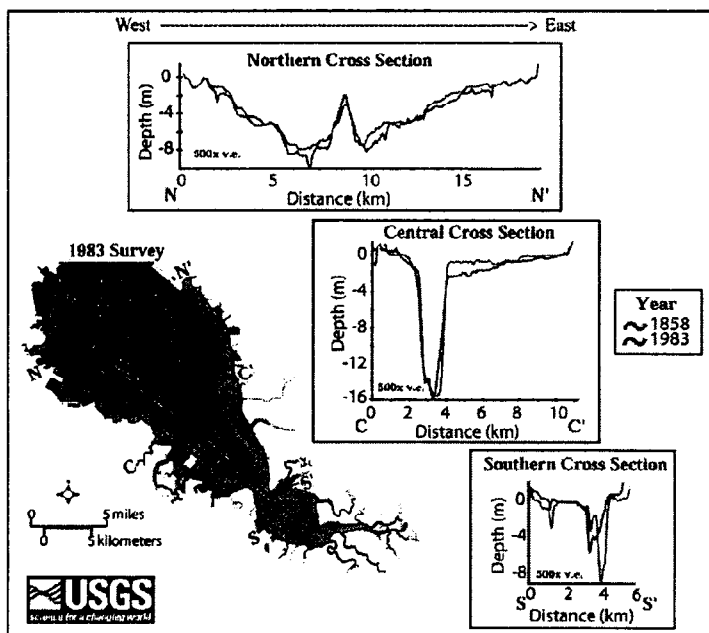
### Summary of Observations

While the primary focus of our study is bathymetry and the deposition and erosion of sediment, we've also included an estimate of change in the area of tidal marsh. Marsh boundaries were used solely for display purposes and approximations of total marsh area. Changes in marsh are not accounted for in sediment volume change calculations.



## Bay Characteristics

Examination of the bathymetric surfaces revealed interesting characteristics of South San Francisco Bay's underwater topography. A main channel, approximately one kilometer in width, runs longitudinally down the majority of the bay. The average depth of the channel is approximately 11 m and is flanked on either side by expansive shoals. The morphology of the bay varies from north to south and, with the exception of the area south of the Dumbarton bridge, has remained relatively stable from 1858 to 1983 (Fig. 12).



**Figure 12.** Preliminary cross section profiles of the bay floor in 1858 and 1983.

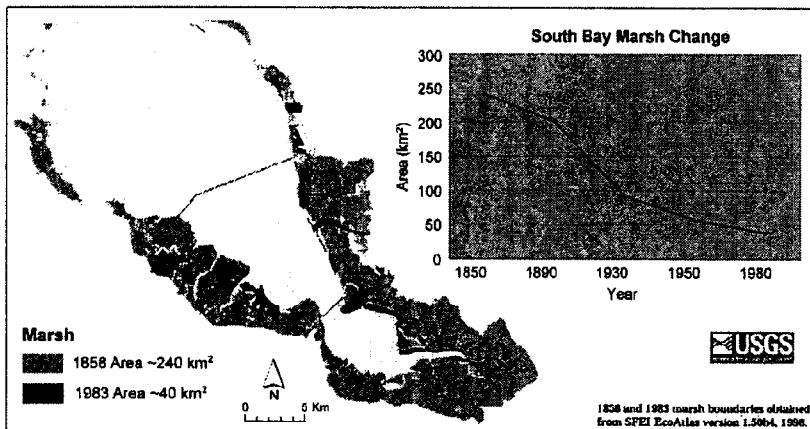
South San Francisco Bay is a relatively shallow estuary. While the average depth for all of San Francisco Bay is 6 m at MLLW (Conomos, 1979), the average depth within our study area is approximately 3 m at MLLW (this value is strongly dependent upon where our northern boundary was placed). Only 25% of the bay is deeper than 5 m at MLLW; the maximum depth is approximately 26 m (near Hunter's Point; see Fig. 1). The 1983 surface area of the bay is approximately 410 km<sup>2</sup>, down from approximately 430 km<sup>2</sup> in 1858.

**Table 8.** 1983 South San Francisco bay characteristics, values relative to MLLW.

statistic	value
Average Depth	3 m
Median Depth	2 m
Surface Area	410 km <sup>2</sup>
Tidal Flat Area	58 km <sup>2</sup>
Navigable Area (deeper than 30ft)	43 km <sup>2</sup>
Shallow Area (less than 6ft deep)	194 km <sup>2</sup>

## Area of Marsh

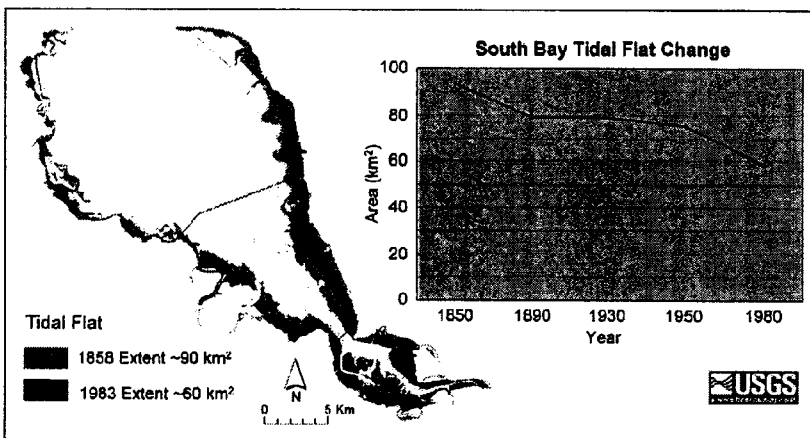
One of the striking features we observed in our time series of South San Francisco Bay is the dramatic loss of tidal marsh throughout the years (Fig 13). From 1858 to 1983 more than 80% of tidal marshes were converted to salt ponds, agricultural fields, and urban areas (the 1858 and 1983 marsh boundaries were obtained from the SFEI EcoAtlas, 1998). The California State Coastal Conservancy, the U.S. Fish and Wildlife Service and the California Department of Fish and Game are currently developing plans to restore 61 km<sup>2</sup> (24 mi<sup>2</sup>) of salt pond to mixed wetland habitat (see <http://www.southbayrestoration.org/index.html> for restoration details). If all 61 km<sup>2</sup> were to be successfully restored to tidal marsh, this would return the marsh to approximately 40% of its 1858 extent.



**Figure 13.** Preliminary change in area of marsh in South San Francisco Bay from 1858 to 1983.

## Area of Tidal Flat

Tidal flat area has decreased from  $92 \times 10^6 \text{ m}^3$  in 1858, to  $58 \times 10^6 \text{ m}^3$  in 1983, representing a 40% decrease in tidal flat area (Fig 14). The majority of this decline has occurred on the eastern shore, north of the Dumbarton Bridge (Fig. 1).



**Figure 14.** Preliminary change in tidal flat area in South San Francisco Bay from 1858 to 1983.

### Net Sediment Volume Change

South San Francisco Bay has experienced a net loss of sediment from 1858 to 1983; however within this timeframe there have been periods of both deposition and erosion. From 1858 to 1898 the bay experienced a small amount of deposition, approximately  $7 \times 10^6 \text{ m}^3$ , followed by an erosional period of  $91 \times 10^6 \text{ m}^3$  from 1898 to 1931. From 1931 to 1956 the system reversed, and  $66 \times 10^6 \text{ m}^3$  of sediment was deposited. From 1956 to 1983 an erosion of approximately  $71 \times 10^6 \text{ m}^3$  was measured.

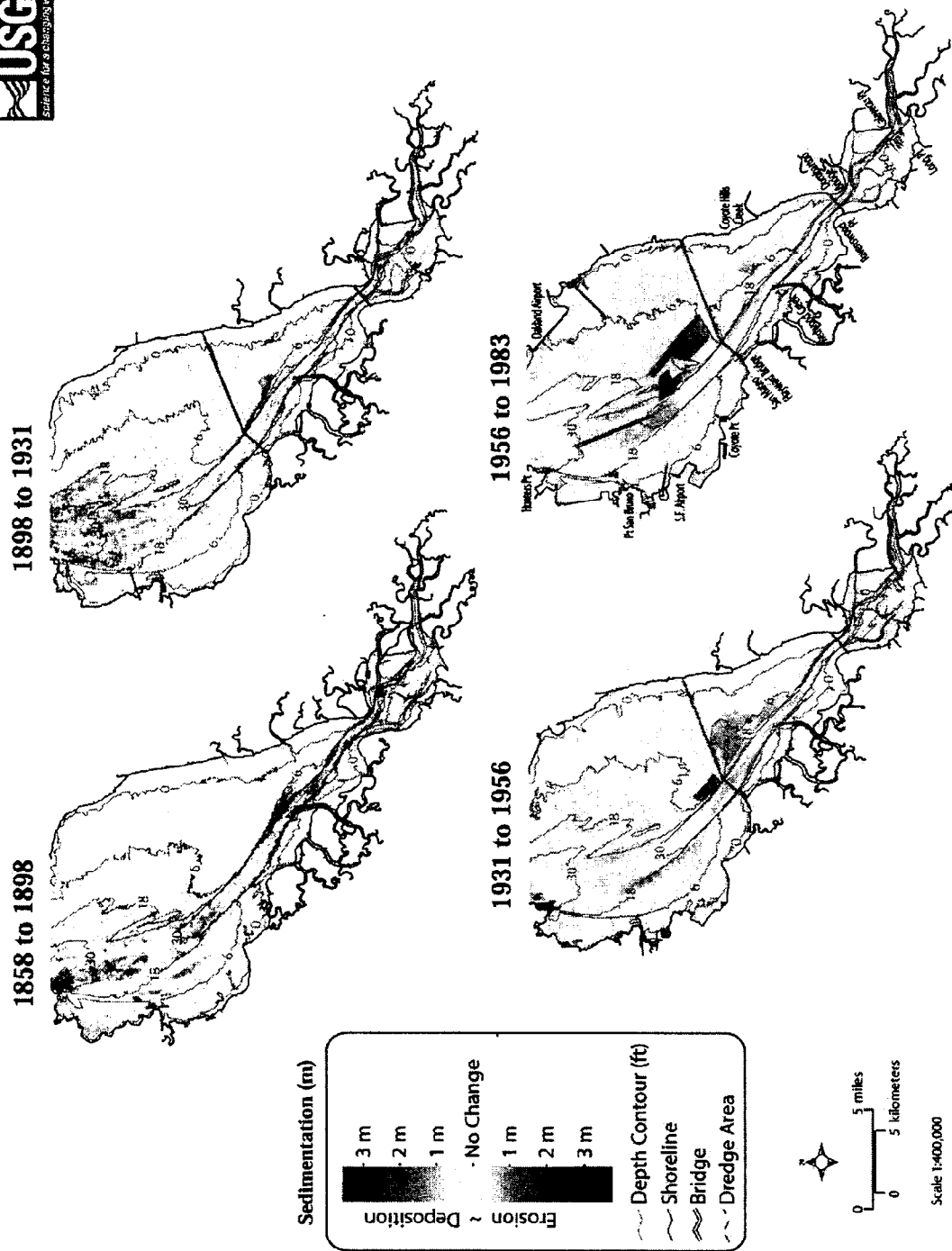
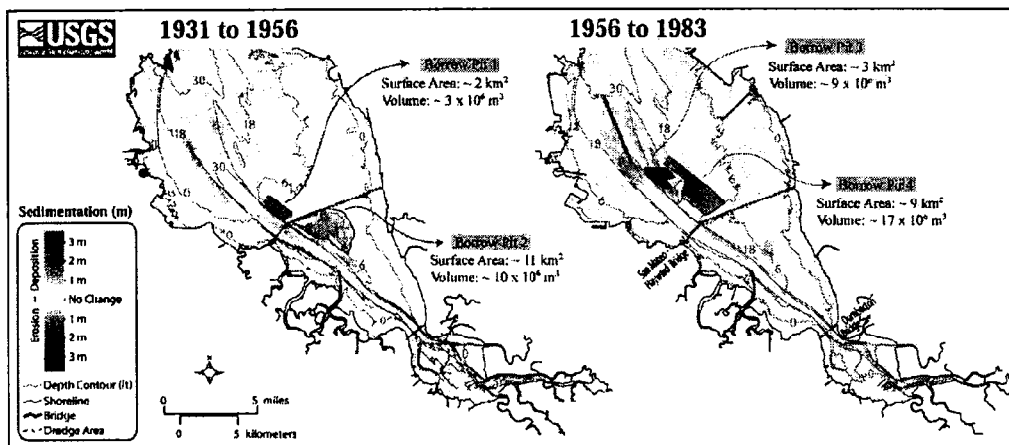
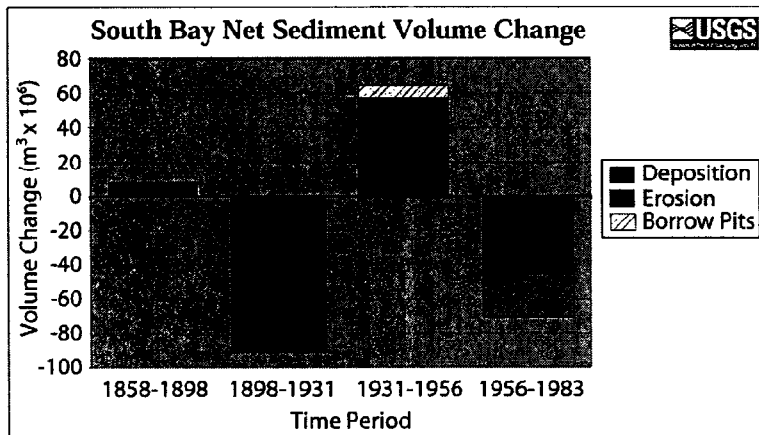


Figure 15. Preliminary maps of sediment deposition and erosion in South San Francisco Bay from 1858 to 1983.

When interpreting calculations of deposition and erosion, it is important to consider the impact that dredging has on the system. Many of the major harbors throughout the bay began routine dredging of sediment as early as the 1800s. Large areas in the bay (borrow pits) were also dredged for material used in bay fill and cement production. We identified borrow pits as areas with anomalous erosion volumes and patterns. The location of the four borrow pits shown in Figure 16 were confirmed by bay area scientists and managers. We can use our grids to estimate the volume of sediment removed by dredging. However, without accurate records of dredging activities (i.e., when dredging occurred, how much sediment was removed, and where sediment was deposited) it is difficult to separate the sediment volume change associated with anthropogenic activities from those associated with natural changes in deposition and erosion. Unless all of the dredging occurred just prior to the collection of the hydrographic survey (allowing no time for sediment to be redeposited at the site), the volumes shown in Figure 16 are minimum estimates. The relative proportion of sediment loss accounted for in these four borrow pits is shown in Figure 17.

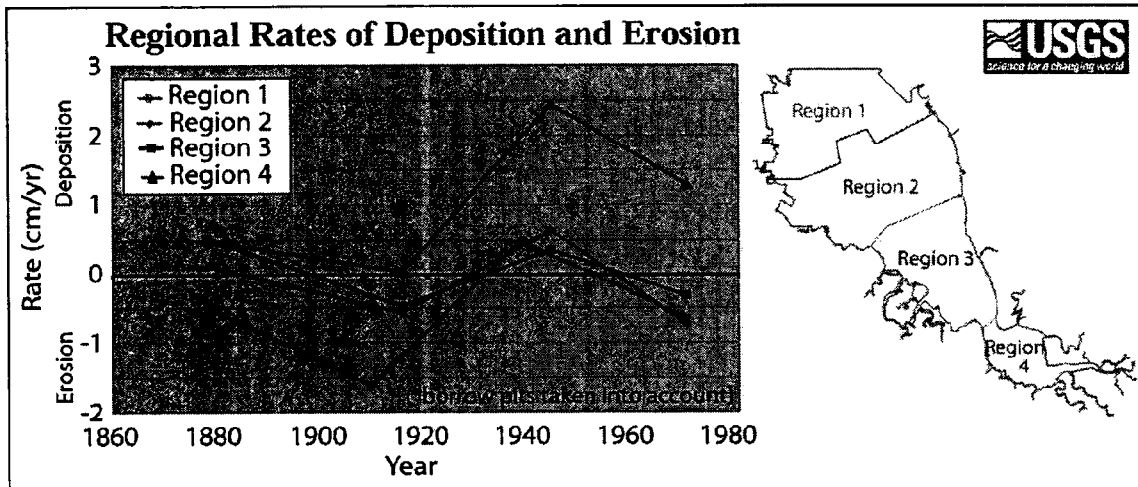


**Figure 16.** Location of sediment borrow pits seen in preliminary 1931 to 1956 and 1956 to 1983 maps of deposition and erosion. Approximate surface areas and volumes represent those at the time in which the hydrographic surveys were conducted (not necessarily equal to the areas and volumes of sediment originally removed).



**Figure 17.** Preliminary South San Francisco Bay net sediment volume change calculations. Our minimum estimates for the volume of sediment removed from borrow pits from 1931 to 1956 and from 1956 to 1983 are indicated by a hachured pattern.

We have calculated net sediment volume rates in four regions to determine how patterns of deposition and erosion vary spatially within the bay. Region 4, the area south of the Dumbarton Bridge, is the only region which has remained depositional over time (Fig. 18). The overall similarity in trends of all four regions, with an offset, is a signature of sediment redistribution from north to south within the bay in conjunction with a changing sediment supply (Jaffe, et al. submitted).



**Figure 18.** Preliminary rates of net deposition and erosion, by region (with borrow pits taken into account).

## Future Work

While this study has provided us with a preliminary look at the long-term patterns of sediment deposition and erosion within South San Francisco Bay, we intend to take a more in-depth look into what implications this may have for both physical and biological processes. As previously mentioned, we plan to improve our surface models by updating features such as shoreline values, 1858 tidal flat soundings, and nearshore morphology as the necessary data becomes available. A Light Detection And Ranging (LIDAR) survey of South San Francisco Bay is scheduled for May of 2004 enabling us to take a closer look at tidal flat geomorphology and document how the tidal flats have changed from 1983 to present. In addition, we would like to conduct a more detailed analysis of the relationship between marsh and tidal flat change and what implications that may have for marsh restoration. Errors in sediment volume change calculations are dependent upon sounding accuracies, uncertainties in determining the relationship of MLLW datums for different surveys, and from grid representations or the interpolation of the original point data (Table 6). These errors will be quantified and a confidence envelope applied to our sediment volume change calculations. We will further investigate what led to the large deposition noted in the 1920/31 to 1956 survey. We intend to continue this research by conducting a similar time series analysis of Central San Francisco Bay which may improve our understanding of trends in sediment deposition during this anomalous period. The completion of Central Bay analyses will allow us to improve estimates of a bay-wide sediment budget.

## Acknowledgements

This research was supported by the U.S. Geological Survey Priority Ecosystem Study of San Francisco Bay and the San Francisco Bay Regional Water Quality Control Board. This report was improved by reviews from Cheryl Hapke and Ann Gibbs.

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- United States Geological Survey San Francisco Bay Bathymetry Web Site [URL: <http://sfbay.wr.usgs.gov/access/Bathy/grids.html>]

### Appendix C

#### Total Mercury Concentrations from Bedded Sediments Collected in Open Channel/Creek Substrate (KLI and EOA 2002; Gunther et al. 2001)

Site	Concentration (mg/kg)	Land Use	Site	Concentration (mg/kg)	Land Use
CCC001	0.47	Industrial	SMC005	0.2	Res/Com
CCC009	0.07	Industrial	SMC024	1.31	Res/Com
CCC020	0.14	Industrial	SMC029	0.63	Res/Com
CCC026	0.47	Industrial	SMC030	0.66	Res/Com
CCC029	0.07	Industrial	SMC031	0.18	Res/Com
CCC030	0.63	Industrial	VFC001	0.18	Res/Com
FSS001	0.06	Industrial	VFC002	0.15	Res/Com
FSS006	0.12	Industrial	VFC010	0.57	Res/Com
MCS009	0.22	Industrial	Arroyo Viejo	0.04	Mixed
MCS012	0.38	Industrial	San Lorenzo S.B.	0.13	Mixed
SCV044	0.05	Industrial	Castro Valley S-3	0.08	Mixed
VFC004	0.33	Industrial	Line 6-G,		
CCC016	0.15	Mixed	Chevron	0.14	Mixed
CCC017	0.11	Mixed	San Leandro		
CCC018	0.1	Mixed	Creek	0.26	Mixed
MCS002	0.36	Mixed	Seminary Creek	0.16	Mixed
MCS003	0.05	Mixed	Lion Creek	0.29	Mixed
MCS004	0.09	Mixed	Alameda Creek	0.11	Mixed
MCS006	0.27	Mixed	Laguna Creek	0.11	Mixed
SCV021	0.12	Mixed	Cabot Creek	0.11	Mixed
SCV024	0.05	Mixed	Aqua Caliente	0.17	Mixed
SCV041	0.03	Mixed	Castro Valley	0.06	Mixed
SCV042	0.06	Mixed	Cerrito Creek	0.34	Mixed
SMC010	0.06	Mixed	Glen Echo	0.17	Mixed
SMC012	0.05	Mixed	Sausal Creek	0.31	Mixed
SMC013	0.11	Mixed	Crandall Creek	0.12	Mixed
SMC028	0.05	Mixed	Scott Creek	0.15	Mixed
VFC009	0.42	Mixed	Strawberry Creek	0.05	Mixed
CCC012	0.03	Res/Com	Dry Creek	0.04	Mixed
CCC019	0.19	Res/Com	Balentine Drive	0.1	Mixed
FSS003	0.02	Res/Com	Codornices	0.49	Mixed
MCS013	0.21	Res/Com			

Average Hg Concentration in Open Channel Sites = 0.21 mg/kg  
 Median Hg Concentration in Open Channel Sites = 0.14 mg/kg

**Appendix C****Total Mercury Concentrations from Bedded Sediments Collected in Open Channel/Creek Substrate (KLI and EOA 2002; Gunther et al. 2001)**

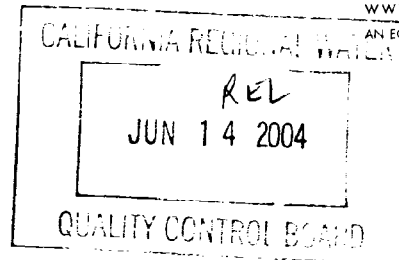
Site	Total Mercury (mg/kg)	Land Use	Site	Total Mercury (mg/kg)	Land Use
CCC001	0.47	Industrial	SMC005	0.2	Res/Com
CCC009	0.07	Industrial	SMC024	1.31	Res/Com
CCC020	0.14	Industrial	SMC029	0.63	Res/Com
CCC026	0.47	Industrial	SMC030	0.66	Res/Com
CCC029	0.07	Industrial	SMC031	0.18	Res/Com
CCC030	0.63	Industrial	VFC001	0.18	Res/Com
FSS001	0.06	Industrial	VFC002	0.15	Res/Com
FSS006	0.12	Industrial	VFC010	0.57	Res/Com
MCS009	0.22	Industrial	Arroyo Viejo	0.04	Mixed
MCS012	0.38	Industrial	San Lorenzo S.B.	0.13	Mixed
SCV044	0.05	Industrial	Castro Valley S-3	0.08	Mixed
VFC004	0.33	Industrial	Line 6-G,		
CCC016	0.15	Mixed	Chevron	0.14	Mixed
CCC017	0.11	Mixed	San Leandro		
CCC018	0.1	Mixed	Creek	0.26	Mixed
MCS002	0.36	Mixed	Seminary Creek	0.16	Mixed
MCS003	0.05	Mixed	Lion Creek	0.29	Mixed
MCS004	0.09	Mixed	Alameda Creek	0.11	Mixed
MCS006	0.27	Mixed	Laguna Creek	0.11	Mixed
SCV021	0.12	Mixed	Cabot Creek	0.11	Mixed
SCV024	0.05	Mixed	Aqua Caliente	0.17	Mixed
SCV041	0.03	Mixed	Castro Valley	0.06	Mixed
SCV042	0.06	Mixed	Cerrito Creek	0.34	Mixed
SMC010	0.06	Mixed	Glen Echo	0.17	Mixed
SMC012	0.05	Mixed	Sausal Creek	0.31	Mixed
SMC013	0.11	Mixed	Crandall Creek	0.12	Mixed
SMC028	0.05	Mixed	Scott Creek	0.15	Mixed
VFC009	0.42	Mixed	Strawberry Creek	0.05	Mixed
CCC012	0.03	Res/Com	Dry Creek	0.04	Mixed
CCC019	0.19	Res/Com	Balentine Drive	0.1	Mixed
FSS003	0.02	Res/Com	Codornices	0.49	Mixed
MCS013	0.21	Res/Com			

**Average Hg Concentration in Open Channel Sites = 0.21 mg/kg**

**Median Hg Concentration in Open Channel Sites = 0.14 mg/kg**



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June 10, 2004

Mr. Richard Looker  
Mr. Bill Johnson  
San Francisco Bay  
Regional Water Quality Control Board  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

Subject: San Francisco Bay Mercury Total Maximum Daily Load Basin Plan Amendment

Dear Mr. Looker and Mr. Johnson:

The Santa Clara Valley Water District (District) staff is pleased to submit comments on the *Mercury in San Francisco Bay Total Maximum Daily Load (TMDL) Proposed Basin Plan Amendment (BPA) and Staff Report*, dated April 30, 2004 (Regional Board Report). District staff supports your efforts to develop this TMDL and offers the following comments for the Board's consideration to help improve the implementation aspect of this effort.

First, the District supports and incorporates by reference the comments on the Staff Report and Proposed Basin Plan Amendment from our consultant, Exponent, Inc., the comments from Santa Clara Valley Urban Runoff Pollution Prevention Program and the comments of its legal counsel on these documents, each sent under separate covers.

However, while there are certainly technical issues that we should continue to discuss, our primary concern is that the implementation of this proposed Basin Plan Amendment could potentially result in our limited resources being used on control measures that aren't the most effective in terms of habitat benefits.

In our recent meeting with Mr. Bruce Wolfe, Mr. Tom Mumley and you, I was assured that the intent of the TMDL is to focus our resources on the most effective measures. I was further encouraged to know that Regional Board staff wants to work with us to ensure that the final Basin Plan Amendment language will ensure that implementation efforts rely on the development of a watershed-wide mercury management strategy which emphasizes the most effective control measures. District staff is committed to working cooperatively with Regional Board staff to develop that strategy, at a conceptual level, over the next couple months.

We believe the watershed based strategy can then be used to guide individual permitting actions by the board to help move us towards a watershed-wide permitting approach. This approach will not only make better use of the Regional Board staff's time but also better use of the resources available to address these environmental issues.



Mr. Looker and Mr. Johnson  
Page 2  
June 10, 2004

As you know, the District is working in partnership with the Regional Water Quality Control Board to implement a similar planning effort to address mercury in the Guadalupe River Watershed. We have mutually agreed to pursue a course that will ensure the Guadalupe River Watershed Mercury TMDL is based on sound science, measurable goals, and feasible implementation measures. As a result of this partnership, we have learned that methylation of mercury varies seasonally and spatially throughout the watershed, that implementation of control measures should be focused on reducing mercury methylation, and that atmospheric sources are significant and alone are likely to result in some species of fish exceeding applicable criteria. We have learned that reservoirs and lakes appear to be areas where methyl mercury is produced, while creeks appear to be where methyl mercury is removed. We have also learned of the role of wetlands in methyl mercury production, and the significance of the differences in the bioavailability of the sources of mercury (such as atmospheric, dissolved, adsorbed, and mineralized).

Based on the lessons learned to date in that effort, District staff believes the proposed Basin Plan Amendments place too much emphasis on controlling mercury in sediment entering the Bay. We recommend adding further text to recognize the importance of control of the upper watershed sources (mines and mining wastes), to encourage control of watershed processes that result in the production of bioavailable mercury, and to acknowledge the relatively greater bioavailability of atmospheric sources. We suggest that the Regional Board shift the emphasis from mercury in sediment to mercury in its methylated form, which has significantly greater bioavailability. By doing this, a more effective implementation plan can be realized.

We would like to work with you to incorporate the following elements in the proposed TMDL:

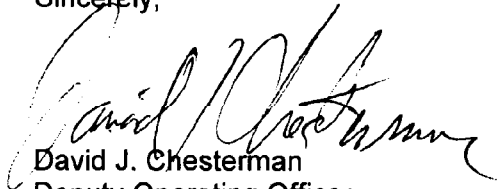
- Development of a watershed-wide mercury management strategy that will focus efforts on most effective control measures and guide individual future permitting actions,
- Encourage actions that reduce methyl mercury production in addition to or instead of mass removal of mercury in sediment,
- Provide flexibility for considering testing and evaluation of new techniques and control measures as a form of implementation to encourage innovation,
- Consider allowing equal credit for actions that isolate mercury sources from the Bay by eventual burial rather than by removal,
- Encouraging actions to address upper watershed sources (mines and mining wastes) of mercury as a priority, to avoid compromising actions taken in the lower watershed.

We understand that there is time, over the next few months, to explore and further develop these concepts and ideas with Regional Board staff before the Basin Plan Amendment is adopted.

Mr. Looker and Mr. Johnson  
Page 2  
June 10, 2004

The District appreciates the efforts of the Regional Board staff on this complex issue to date. We look forward to continuing to work together to develop TMDLs for Mercury based on sound science that address the Guadalupe River Watershed and the San Francisco Bay and provides the flexibility for effective implementation.

Sincerely,

A handwritten signature in black ink, appearing to read "David J. Chesterman", is written over the typed name.

David J. Chesterman  
Deputy Operating Officer  
Guadalupe Watershed Division Manager

350 Frank H. Ogawa Plaza, Suite 900  
Oakland, CA 94612-2016

T. 510.452.9261  
F. 510.452.9266

[www.savethebay.org](http://www.savethebay.org)

June 14, 2004

Richard E. Looker, Water Resources Control Engineer  
San Francisco Bay Regional Water Quality Control Board  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

Dear Mr. Looker:

Thank you for the opportunity to comment on the adoption of an amendment to the Water Quality Control Plan for the San Francisco Bay Basin to incorporate a TMDL for mercury in San Francisco Bay and an implementation plan.

Save The Bay represents 10,000 members who have a keen interest in water quality issues related to San Francisco Bay. Save The Bay also advocates for protection, enhancement, and restoration of the Bay's wetlands and associated wildlife habitat.

The proposed Basin Plan amendment and San Francisco Bay Mercury TMDL are supported by research and documentation incorporating the latest scientific understanding of the problem of mercury contamination in San Francisco Bay and identifying the sources of contamination. The proposed amendment to the Basin Plan also recognizes that control of mercury contamination in San Francisco Bay is an area of active research and that control strategies are being developed.

The evolving nature of technical and scientific knowledge related to mercury clean up in San Francisco Bay, and uncertainties in the assumptions about the time period before a reduction in mercury contamination will be seen, emphasize the importance of continuous monitoring and review of the proposed TMDL implementation measures. As proposed, review of the mercury TMDL, including evaluation of new and relevant monitoring data, special studies, and scientific literature is to be done every five years to determine if targets, allocations, or implementation actions need to be modified.

Considering the importance of new information and the potential of scientific data gathered to benefit, accelerate, or modify the proposed implementation actions, we suggest that a review schedule be devised that is more sensitive to the potential for new information related to mercury contamination and removal in San Francisco Bay. This could be accomplished by ramping the review over a twenty-year period (the time period assumed in the staff report to show significant change in sediment contamination levels), for instance, having more frequent review in the first ten years. Alternatively, instead of a set time period, the review could be triggered by new data of significance to the control of mercury in Bay sediments or, for example, to the process of mercury methylation in Bay wetland sediments. The current proposed review schedule, though seemingly

# SAVE THE BAY

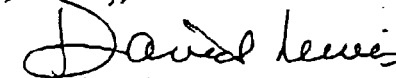
Save The Bay comments 06-14-04

2

adequate, may be too rigid to provide timely response to new information that could be acted on relatively quickly with benefit to San Francisco Bay.

Thank you for consideration of these comments.

Sincerely,

A handwritten signature in cursive script that reads "David Lewis". The signature is written in dark ink and is positioned above the printed name and title.

David Lewis  
Executive Director

Writer's direct phone

(415) 544-1014

Writer's e-mail

tmaiden@sf.seyfarth.com

June 14, 2004

**VIA ELECTRONIC AND U.S. MAIL**

Bill Johnson  
Richard Looker  
California Regional Water Quality Control Board,  
San Francisco Bay Region (2)  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

Re: Comments on April 30, 2004 Proposed Basin Plan Amendment and Staff Report re  
Mercury in San Francisco Bay

Dear Sirs:

On behalf of the Guadalupe Rubbish Disposal Company ("GRDC"), this letter provides written comments to the California Regional Water Quality Control Board, San Francisco Bay Region ("RWQCB")'s April 30, 2004 Proposed Basin Plan Amendment and Staff Report addressing a Total Maximum Daily Load ("TMDL") for mercury in San Francisco Bay (the "Draft TMDL").

**COMMENTS**

**1. The TMDL should consider the unique issues raised by significant "legacy sources" that may impact the Bay**

The Draft TMDL identifies numerous sources which result from "legacy problems." These include but may not be limited to historic mercury mining operations in the Guadalupe River watershed, gold mining operations in the Central Valley in which mercury was used and existing sediment deposits in the Bay. Unfortunately, the TMDL fails to adequately consider the difficulties (both in terms of costs and social disruptions) of addressing these legacy issues when setting and its (waste)load allocations.

The proximity of large cinnabar-producing lands in the Guadalupe watershed as well as decades, even centuries of sedimentation from mining activities in both the Central Valley and the Guadalupe River create an elevated "background level" for mercury, and must be considered in any

economic and feasibility analysis for meeting (waste)load allocations and water quality objectives. For practical purposes, the Draft TMDL treats the entire Guadalupe watershed almost as a single source and fails to adequately address the practical costs for the many potential upgradient point and non-point sources in trying to achieve the proposed allocation from current versus legacy sources.

Many potential “sources” today have never been involved in mining operations and never profited from such operations. There is no recognition in the Draft TMDL as to what constitutes an equitable allocation for currently existing entities who are being held responsible for alleged acts or omissions of up to 150 years ago.

Moreover, digging up and removing potential source areas may result in greater increases in bio-availability of contaminants as opposed to other control mechanisms. The impacts from likely upgradient mitigation measures to address legacy sources cannot be avoided by assuming that they will be addressed in a future TMDL for that local area.

Furthermore, the draft TMDL fails to require reductions in the largest source of mercury – the Bay sediments. Instead, the TMDL assumes no action will be taken to reduce this source other than what might be considered natural attenuation. There is no basis for the TMDL to impose stringent allocations and excessive source reductions on upstream sources while ignoring the single largest source of mercury in the Bay – the Bay sediments.

**2. The TMDL should consider the impacts of in-bay disposal of dredged material and regulate sediment disposal as a source of mercury.**

The Draft TMDL notes that of the three million cubic yard of material dredged from the bottom of San Francisco Bay each year, approximately 2.3 million cubic yards of this material is re-deposited back into the Bay. Draft TMDL at 31.

The dredging of material and the disposal of mercury laden sediments into the Bay expose huge swaths of otherwise covered and relatively “safe” sediments to open water, sunlight and possibly aeration, resulting in the increased risk of mercury methylation that otherwise would not occur. The RWQCB must view the uncovering of this material as the “generation” of mercury and take reasonable actions to regulate it as a source.

Of equal importance, the RWQCB must consider the impacts of the “disposal” of 2.3 million cubic yard of potentially mercury laden sediment into the Bay each year. Even if this sediment was dug from the Bay, once it has been dredged up, there is an opportunity to treat it or dispose it in other ways and in other places that could result in a net reduction of an additional 2.3 million cubic yards of sediment each year. The RWQCB should work with the U.S. Army Corps of Engineers and other interested agencies to require more stringent disposal standards for sediment containing unacceptable levels of mercury (especially in areas that are close to wetlands or other areas where methylation is more likely to occur). Alternatives, including but not limited to disposal outside the Bay, should be considered. This could dramatically decrease the methylation of mercury laden sediments in the Bay, the single largest “source” of mercury as noted in the Draft TMDL.

3. **The Draft TMDL fails to consider all relevant alternative wasteload allocation methodologies.**

An essential and critical element of any TMDL is the methodology used to establish wasteload allocations. Yet, the Draft TMDL provides no rationale, nor any analysis of why it has selected the proposed scheme for allocation. Guidance from the U.S. Environmental Protection Agency (“EPA”) Office of Water Regulations and Standards Assessment and Watershed Protections Division has identified numerous possible wasteload allocation schemes, including but not limited to:

- (1) Equal percent removal (equal percent treatment);
- (2) Equal effluent concentrations;
- (3) Equal total mass discharge per day;
- (4) Equal mass discharge per capita per day;
- (5) Equal reduction of raw load (pounds per day);
- (6) Equal ambient mean annual quality;
- (7) Equal cost per pound of pollutant removed;
- (8) Equal treatment cost per unit of production;
- (9) Equal mass discharged per unit of raw material used;
- (10) Equal mass discharged per unit of production;
- (11) Percent removal proportional to raw load per day;
- (12) Larger facilities to achieve higher removal rates;
- (13) Percent removal proportional to community effective income;
- (14) Effluent charges (dollars per pound, etc.);
- (15) Effluent charge above some load limit;
- (16) Seasonal limits based on cost-effectiveness analysis;
- (17) Minimum total treatment cost;
- (18) Best availability technology (BAT) (industry) plus some level for municipal inputs;

- (19) Assimilative capacity divide to require an "equal effort among all dischargers";
- (20) Municipal: treatment level proportionate to plant size;
- (21) Industrial: equal percent between best practicable technology (BPT) and BAT, i.e., Allowable wasteload allocation:  
$$(WLA) = BPT - x/100 (BPT - BPT) \quad ; \text{ and}$$
- (22) Industrial dischargers given different treatment levels for different streamflows and seasons.

EPA Technical Support Document for Water Quality-based Toxics Control, Office of Water (EN-336); EPA/505/2-90-001; PB91-127415, March 1991, Table 4-1, at p.69.

Notwithstanding this substantial number of alternative approaches, the Draft TMDL only considers one "proportional allocation" alternative methodology (see, Draft TMDL at 96-98). This allocation is grossly disproportionate in the way it treats identified sources of mercury and fails to consider the economic impacts on those sources.

The final TMDL should consider all reasonably relevant alternative allocation methodologies to the one currently chosen and discuss why the existing allocation methodology is superior to all other methodologies. A viable allocation scheme must address, among other factors: a) increased costs of mitigation in areas with elevated background levels of mercury due to naturally occurring mineral deposits that are linked to mercury; b) credits for recent and significant efforts to remove calcine deposits and other potential sources of mercury from the Guadalupe River watershed; and c) the unique differences between point and non-point sources in controlling legacy issues.

**4. The Draft TMDL fails to comply with CEQA and the Porter-Cologne Water Quality Act by deferring an analysis of the economic impacts of its Implementation Plan**

Both CEQA and the Porter-Cologne Water Quality Control Act require the RWQCB to consider the economic costs of reasonably foreseeable methods of compliance with proposed performance standards or water quality objectives. As stated in the Staff Report, the Draft TMDL includes performance standards in the form of mercury concentration targets and reduction allocations. Draft TMDL at 101-02. However, despite the Staff Report's acknowledgment that implementation of the Draft TMDL "could place substantial economic burdens on the regulated community," the Draft TMDL provides only a cursory economic analysis of its economic impacts. Draft TMDL at p. 106.

(a) First, with respect to the Central Valley and Guadalupe River Watersheds, the Staff Report relies heavily on the Clean Water Act's requirement that separate TMDLs be implemented for those water bodies irrespective of whether the Draft TMDL for San Francisco Bay is approved.

In doing so, the Staff Report avoids a complete and thorough economic analysis by arguing, in part, that the cost of implementing the TMDLs for those two watersheds is unknown because they have not been drafted yet. Therefore, it is impossible to know whether implementation of the Draft TMDL will result in costs above and beyond those that will be incurred in the implementation of the TMDLs for the Central Valley and Guadalupe River Watersheds. Consequently, the Staff Report suggests that the costs of implementing the TMDLs for the Central Valley and Guadalupe River Watersheds will be considered when those TMDLs are drafted.

This analysis is faulty insofar as it is circular in logic. In essence, this approach amounts to a deferral of the economic impact analysis of the Draft TMDL until after it is adopted and subsequent TMDLs are proposed for the Central Valley and Guadalupe River Watersheds, because not enough specific information is known at this time to perform an adequate analysis. However, the Draft TMDL contains specific and substantial numeric reductions in the amount of mercury entering the Bay from those two watersheds, which will undoubtedly cost a great deal to implement. The fact that the Draft TMDL does not specify the exact measures that the individual stakeholders within those two watersheds must undertake to satisfy these numeric targets does not lessen their dramatic economic impact, particularly in the case of the Guadalupe Watershed which must reduce its mercury load by 98% in the relatively short period of 20 years (given the estimated 120-year time period needed to achieve the Draft TMDL's targets). Draft TMDL at p. S-2. Furthermore, the Draft TMDL for the Bay will likely have a substantial effect on the substance of the regulations imposed by the TMDLs for the Central Valley and Guadalupe River Watersheds when they are drafted. In sum, the economic impacts of the Draft TMDL are both real and substantial, and therefore, must be thoroughly addressed before the Draft TMDL is adopted, just like the economic impacts of the TMDLs for the Central Valley and Guadalupe River Watersheds will have to be assessed individually without simply piggybacking on the economic analyses in the Draft TMDL.

(b) Second, the discussion in the Draft TMDL regarding the various possible mercury reduction measures and their respective costs is too vague and broad to provide any meaningful sense of the overall cost to achieve the Draft TMDL's targets. There are seven such reduction measures mentioned, for which the cost varies widely. Draft TMDL at p. 103. For example, "Mercury Mine Site Cleanup" could cost as little as \$520 or as much as \$15 million per acre; "Mercury Site Cleanup" could cost from \$270 to \$3.1 million per cubic yard, and the Draft TMDL includes a caveat that as broad a range as that is, it may still "not be representative of mercury site cleanup costs." *Id.* An economic range of under one thousand dollars to many millions, possibly billions of dollars depending on the sizes of cleanup sites, is so broad that it is useless and provides no basis for a realistic estimate of the economic impacts of the Draft TMDL.

At the very least, an estimate of the number of sites involved, their approximate sizes and the precise cleanup methods or procedures contemplated at each and their respective costs are required to perform any kind of economic analysis beyond pure speculation. The Draft TMDL does not contain any such information, and furthermore, the titles used to describe the various mercury reduction measures, such as "Mercury Mine Site Cleanup" and "Ecosystem Modification" are so vague that stakeholders have no way of calculating the extent of cleanup activity expected of them or the cost.

(c) Third, with respect to bed erosion, the single largest source of mercury in the Bay, the Draft TMDL simply states that "Because bed erosion is a natural process due to uncontrollable factors, the Basin Plan Amendment does not prescribe any implementation actions to reduce the bed erosion mercury load. Therefore, there are no economic costs associated with reducing this load." Draft TMDL at p. 102. The Draft TMDL fails to account for 3 million cubic yards of dredging and 2.3 million cubic yards of sediment disposal within the Bay annually. This is a substantial factor that can and should be regulated and results in risks and related costs that can be estimated.

5. **The Draft TMDL places too much emphasis on "unknown" sources of mercury.**

The Draft TMDL sets exceedingly high "margins of safety" in part because "there *may* be other less well understood sources [of mercury] that are yet to be discovered. These *may* include mining sources . . . and other contaminated sites within and in the vicinity of the bay . . ." Draft TMDL at 33 (emphasis added). This statement, without any other support to back it up, is merely an excuse to support overly stringent margins of safety as an easy means of regulation. There are already numerous "margins of safety" built into other facets of the Draft TMDL, including but not limited to the fish tissue, bird egg and sediment concentration targets, so that additional margins of safety are not required in other portions of the document, including source assessment. Rather, the final TMDL should be based on existing and relevant information including reasonably identifiable sources. While it will always be possible that some additional source *may* exist, the TMDL must make a reasonable estimate of such sources, both in number and quantity, if it hopes to achieve the support of all stakeholders (including identified sources that must work within proposed (waste)load allocations).

6. **Acknowledgement of and reservation of rights relative to other commenters.**

GRDC has just received and is in the process of reviewing the comments of other stakeholders in this TMDL, including but not limited to the Santa Clara Valley Urban Runoff Pollution Prevention Program, the County of Santa Clara and Buckhorn, Inc. GRDC acknowledges these comments and reserves the right to adopt them, in whole or in part, at future public hearings and subsequently in the administrative process related to the adoption of a mercury TMDL for San Francisco Bay.

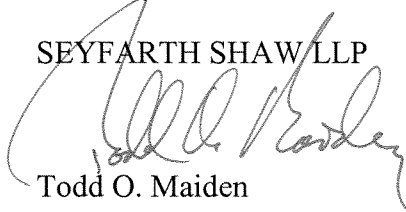
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### Conclusion

In closing, GRDC appreciates this opportunity to provide constructive comments so that the RWQCB can develop a final TMDL which not only achieves reasonable health and environmental objectives but does so in an equitable and cost effective manner. GRDC also intends to participate in the June 16, 2004 hearing on the Draft TMDL and to respond to any questions the RWQCB or its staff may have regarding the points raised in this letter. However, please contact the undersigned if you or your staff have any questions regarding the points raised in this letter.

Sincerely,

SEYFARTH SHAW LLP

A handwritten signature in dark ink, appearing to read "Todd O. Maiden", is written over the printed name and firm name.

Todd O. Maiden

cc: Andrew Kenefick, Esq.  
Eddie Pettit



## SOUTH BAYSIDE SYSTEM AUTHORITY

JOINT POWERS AUTHORITY ————— *A Public Entity*

1400 Radio Road • Redwood City, California 94065-1220 •

650/591-7121

FAX 650/591-7122

City of Belmont

City of Redwood City

City of San Carlos

West Bay Sanitary District

Dr. Thomas Mumley  
Planning and TMDLs Division Chief  
San Francisco Bay Regional Water Quality Control Board  
1515 Clay Street, Suite 1400  
Oakland, California 94612

June 11, 2004  
13-80

Subject: Comments on the "Mercury in San Francisco Bay Total Maximum Daily Load (TMDL) Proposed Basin Plan Amendment and Staff Report" dated April 30, 2004

Dear Dr. Mumley:

SBSA appreciates the opportunity to comment on the Mercury TMDL and proposed Basin Plan Amendments. The Mercury TMDL clearly articulates the science used to develop the TMDL and its limitations. We support the adaptive process to refine the TMDL as additional information becomes available. We encourage the Regional Board to work collaboratively with the stakeholders developing the mechanisms that will result in achieving the desired mercury reductions while not imposing permit conditions that are technically and/or economically achievable.

We are concerned with some of the changes in the implementation plan for point sources contained in the April 2004 draft Mercury TMDL as compared with the June 6, 2003 draft. Specifically, the reduction in Waste Load Allocation (WLA) for the POTW group from 17 kilograms per year (kg/yr) in the June 2003 draft to 14 kg/yr in the April 2004 version, and the change in averaging period for measuring compliance with the WLAs for point source discharges to an annual basis compared to the a five-year average basis that was contained in the June 2003 draft. The changes made in this last draft will have very little impact in attaining the mercury sediment targets, but could have significant impacts from the standpoint of NPDES permit compliance.

SBSA has a permitted average dry weather flow capacity of 29 MGD. This permit limit was based on the capacity needs identified in approved General Plans of the many planning jurisdictions in the SBSA service area, supported by substantial work in water quality analysis, facilities planning, and environmental review. The proposed allocation for mercury for SBSA in the April 2004 TMDL is insufficient to meet the anticipated annual average flow at the currently permitted capacity. The TMDL should explicitly acknowledge the need for future growth and development, and contain a WLA that can accommodate this.

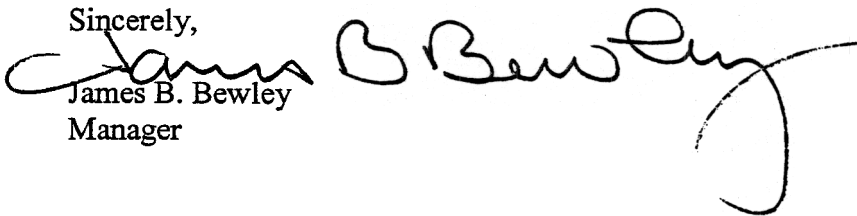
SBSA provides advanced level treatment with filtration following biological secondary treatment and is a partner with Redwood City in a major recycled water program. Mercury is identified as a "pollutant of concern" in our pretreatment and pollution prevention programs and we are participating in joint programs with the Bay Area Pollution Prevention Group and local efforts for reduction of mercury discharge to sewers in collaboration with City of Palo Alto. We have made progress over the past several years but are approaching the point where the ability for further reductions is uncertain.

Lowering the POTW WLA allocation and changing the averaging period from five years to one year greatly increase the likelihood that SBSA would be found exceeding the allocation while contributing little towards meeting the TMDL objectives. In SBSA's case these actions are clearly growth limiting.

SBSA recommends that the POTW WLA be kept as shown in the June 2003 draft, the averaging period for POTWs be set as five years, the Basin Plan amendments are clear that the water quality based effluent limits (WQBEL) for POTWs are to be established by a watershed WLA, not in individual NPDES limits.

Thank you for the opportunity to provide these comments. We look forward to your continuing to work with Bay Area Clean Water Agencies and Clean Estuary Partnership in resolving these issues.

Sincerely,

A handwritten signature in black ink, appearing to read "James B. Bewley". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

James B. Bewley  
Manager

# SBSA - Mercury Mass Emission - Cuurent and Projected

Existing Flows				Permitted Flow			
				32.9			
				Assumed future flow Annual Average			Annual Average Mass
Month	Monthly Average Flow MGD	Concentration ug/L	Annual Average kg/yr	MGD	Concentration ug/L	kg/yr	kg/yr
Feb-01	23.884	0.0156		32.9	0.0156	0.709	
Mar-01	21.565	0.0179		32.9	0.0179	0.813	
Apr-01	19.329	0.0204		32.9	0.0204	0.927	
May-01	18.461	0.019		32.9	0.0190	0.863	
Jun-01	18.239	0.01		32.9	0.0100	0.454	
Jul-01	17.295	0.014		32.9	0.0140	0.636	
Aug-01	16.467	0.014		32.9	0.0140	0.636	
Sep-01	16.153	0.014		32.9	0.0140	0.636	
Oct-01	16.136	0.015		32.9	0.0150	0.682	
Nov-01	18.210	0.0165		32.9	0.0165	0.750	
Dec-01	21.847	0.0068		32.9	0.0068	0.309	
Jan-02	19.400	0.013	0.383	32.9	0.0130	0.591	0.667
Feb-02	15.9	0.049	0.430	32.9	0.0490	2.227	0.794
Mar-02	16.8	0.015	0.414	32.9	0.0150	0.682	0.783
Apr-02	15.6	0.011	0.389	32.9	0.0110	0.500	0.747
May-02	14.9	0.013	0.371	32.9	0.0130	0.591	0.724
Jun-02	14	0.011	0.367	32.9	0.0110	0.500	0.728
Jul-02	16.4	0.018	0.374	32.9	0.0180	0.818	0.743
Aug-02	16.4	0.017	0.379	32.9	0.0170	0.773	0.755
Sep-02	15.2	0.014	0.378	32.9	0.0140	0.636	0.755
Oct-02	15	0.012	0.370	32.9	0.0120	0.545	0.743
Nov-02	16.2	0.012	0.358	32.9	0.0120	0.545	0.726
Dec-02	23.5	0.016	0.384	32.9	0.0160	0.727	0.761
Jan-03	18.2	0.010	0.376	32.9	0.0100	0.454	0.750
Feb-03	17.8	0.012	0.311	32.9	0.0120	0.545	0.610
Mar-03	17.7	0.013	0.309	32.9	0.0130	0.591	0.602
Apr-03	19.23	0.015	0.322	32.9	0.0150	0.682	0.617
May-03	17.7	0.0093	0.319	32.9	0.0093	0.423	0.603
Jun-03	16.7	0.0099	0.320	32.9	0.0099	0.450	0.599
Jul-03	16.1	0.011	0.307	32.9	0.0110	0.500	0.573
Aug-03	15.9	0.0079	0.289	32.9	0.0079	0.359	0.538
Sep-03	15.97	0.0072	0.278	32.9	0.0072	0.327	0.512
Oct-03	15.7	0.0095	0.274	32.9	0.0095	0.432	0.503
Nov-03	15.9	0.0120	0.274	32.9	0.0120	0.545	0.503
Dec-03	19.5	0.0096	0.252	32.9	0.0096	0.436	0.479
Jan-04	20.0	0.014	0.263	32.9	0.0140	0.636	0.494
Feb-04	21.0	0.0095	0.262	32.9	0.0095	0.432	0.484
Mar-04	18.1	0.012	0.260	32.9	0.0120	0.545	0.481
Apr-04	16.7	0.013	0.252	32.9	0.0130	0.591	0.473
May-04	16.4	0.011	0.254	32.9	0.0110	0.500	0.479
			MAX 0.43				MAX 0.79
							MIN 0.47
							Proposed Allocation 0.44



June 11, 2004

Mr. Bruce Wolfe  
Executive Officer  
California Regional Water Quality Control Board  
San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

**Re: COMMENTS ON APRIL 30, 2004 PROPOSED BASIN PLAN AMENDMENT AND STAFF REPORT, MERCURY IN SAN FRANCISCO BAY**

Dear Mr. Wolfe:

This letter contains the initial comments of the City of Sunnyvale on the *Mercury in San Francisco Bay Total Maximum Daily Load (TMDL) Proposed Basin Plan Amendment and Staff Report* (TMDL Report), issued on April 30, 2004. The City's consultant EOA, Inc. provided comments on behalf of the City on the June 6, 2003 version of the TMDL report. Several of those comments are reiterated here since they were never responded to by staff and are still applicable to the current TMDL report version.

The current version of the staff report and TMDL has significantly and adversely changed from the prior version regarding POTW allocations as follows:

- (a) The pooled allocation to POTWs has been reduced from 17 kg/yr to 14 kg/yr. This is based on revised load calculations (adding in data from 2003) using a modified statistical approach developed by Regional Board staff.
- (b) The pooled allocation has been changed from a 5-year average value to an annual average value.
- (c) The individual load allocations to POTWs have been significantly changed. The current allocations are based on recent performance in terms of mass loads of mercury discharged to the Bay. This has significantly reduced the load allocations to facilities with advanced treatment, such as Sunnyvale, to the point that we will either have no increment for growth or will exceed the allocation when the economy rebounds based on historical loads.

The City has been actively tracking the mercury TMDL effort through participation in the Clean Estuary Partnership (CEP) and prior mercury workgroups. However, to the best of our knowledge, there was no stakeholder involvement in developing these changes, nor even advance notification of these changes. The TMDL report was simply released with these major changes unannounced on April 30<sup>th</sup>.

The City finds this particularly disturbing since it was just over one year ago, at the May 2003 RWQCB Board meeting, that the Board members directed staff to develop less onerous interim

**ADDRESS ALL MAIL TO: P.O. BOX 3707 SUNNYVALE, CALIFORNIA 94088-3707  
TDD (408) 730-7501**

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mercury mass limits that would not punish the POTWs for their excellent plant performance, pollution prevention activities, and water recycling efforts, and not put them at risk of non-compliance in the future. The proposed mass allocation for Sunnyvale does exactly the opposite. The proposed allocation is a factor of six times more stringent (0.083 vs 0.49 kg/yr) than the value developed by your permitting staff that is included in the City's current NPDES permit adopted in August 2003 (see attached June 18, 2003 RWQCB staff summary report for Items 8, 9, and 10 on the mass limit history and derivation). Sunnyvale had serious concerns about complying with even the 0.49 kg/yr permit limit in the future as flows approached design capacity.

To comply with this allocation Sunnyvale would be required to stay at or below the current exceedingly low average effluent concentration of 4 ng/l and to cap its flow and hence growth at the last seven year's annual average flow of 14.5 mgd. Flow in four of those seven years exceeded 14.5 mgd, reaching 18 mgd in 1998. When the local economy rebounds to those prior levels, and/or a high rainfall year occurs, Sunnyvale will exceed its proposed individual WLA.

To be allowed to make use of its permitted design capacity of 29.5 mgd, Sunnyvale would be required to reduce its effluent mercury concentration in half to 2 ng/L. This is approximately the background concentration in the potable water supply. The Sunnyvale POTW already performs at an extremely efficient level and removes over 98% of the influent mercury. As explained in the detailed comments attached, there are no known additional pollution prevention or plant optimization measures that could provide an additional 50% reduction in effluent concentrations.

Therefore, to be allowed to make use of its permitted design capacity of 29.5 mgd, Sunnyvale would be required to find some way to offset an additional mass of approximately 0.085 kg/year. The only known means to eliminate/offset mass in the discharge is to divert effluent flow from the Bay to water recycling. Sunnyvale is a strong water recycling proponent and has had an active water recycling program in place for over 10 years. The City has spent over \$20 million on its water recycling infrastructure and recycles about 1 mgd on an annual average basis.

The new pipelines and facilities to reach all those increasingly further away and smaller landscape irrigation sites would cost another \$20 million. However, an unfortunate Catch-22 with water recycling is that since the effluent mercury concentration is so low (4 ng/L), each million gallons of water recycled diverts only miniscule amounts of mercury from the Bay. In the case of Sunnyvale, each additional 1 mgd that could potentially be recycled would only remove 0.0055 kilograms per year (kg/yr) of mercury. This 0.0055 kg/yr represents about six percent of the offset needed to be able to accept new flows (of wastewater or possibly contaminated stormwater) up to the full permitted design capacity of 29.5 mgd.

Sunnyvale understands that the allocation is currently being proposed as a trigger, along with a performance based concentration trigger, both of which would have to be exceeded before additional special studies and/or enforcement would be initiated. While this may appear to be structured to avoid nuisance compliance issues, the underlying basis for the allocation is inequitable and contrary to the Board's frequently asserted position to encourage, not penalize the best performing facilities like Sunnyvale. Each time compliance with the individual allocations is evaluated, it will appear that Sunnyvale is a poorly performing POTW, either near,

structured to avoid nuisance compliance issues, the underlying basis for the allocation is inequitable and contrary to the Board's frequently asserted position to encourage, not penalize the best performing facilities like Sunnyvale. Each time compliance with the individual allocations is evaluated, it will appear that Sunnyvale is a poorly performing POTW, either near, or likely above its allocation. In reality, the opposite is the case. Sunnyvale effluent has one of the lowest mercury concentrations of any POTW in the region.

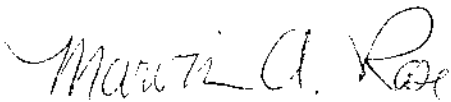
Sunnyvale respectfully requests that this mercury TMDL item be removed from the June 16, 2004 Board agenda to allow the stakeholders and the Regional Board time to develop a more appropriate and equitable approach for setting and implementing the POTW WLA. The City has great concerns that these inequitable and unnecessary individual POTW WLAs will be incorporated into NPDES permits and become semi-permanent due to anti-backsliding considerations. One potential solution to this concern would be to simply delete the individual WLAs but to continue to track individual POTW performance relative to the pooled WLA. This was the approach originally proposed by BACWA, and accepted by Board staff, for POTWs.

Sunnyvale, as a co-permittee of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) also has serious concerns about the technical basis for and the attainability of the stormwater load allocations. The City supports, and includes by reference, the comments provided by SCVURPPP, Mr. Robert Falk on behalf of SCVURPPP, and by the Bay Area Stormwater Management Agencies Association (BASMAA).

This mercury TMDL will set the precedent for how other upcoming legacy pollutant TMDLs (e.g., PCBs, pesticides) address de minimis POTW sources. It is critical that adequate time, resources, and a transparent and open process be provided to finalize this mercury TMDL in a manner so that it can serve as viable model for other TMDLs instead of a catalyst for litigation.

We appreciate the opportunity to submit these initial written comments.

Sincerely,



Marvin A. Rose  
Director of Public Works

ATTACHMENTS

**ATTACHMENT TO CITY OF SUNNYVALE COMMENT LETTER  
ON  
RWQCB APRIL 30, 2004 MERCURY TMDL REPORT**

This Attachment provides City of Sunnyvale detailed comments on the April 30, 2004 Mercury TMDL Staff Report and Basin Plan Amendment.

**1. Eliminate the individual mass “allocations” for POTWs.**

The mass “allocation” approach used in the previous version of the staff report relied upon the relative volumes of discharge to the Bay. The “allocations” presented in the April 30 staff report rely on current loadings. This approach is problematic for several reasons. First, it tends to penalize advanced secondary treatment plants which have the lowest loads per volume of discharge and also have less variable loads. Second, it also tends to penalize plants that have stepped forward to implement reclamation or aggressive pollution prevention and have reduced their loadings to the Bay, accordingly. Finally, it penalizes plants that have remaining un-utilized design capacity and gives extra capacity to plants that will never utilize the “allocation”. The prior allocation scheme tended to reward these advanced secondary plants (such as Sunnyvale’s), which is a more equitable approach.

The individual mass allocations create concern that they will be implemented directly into permits at some time in the near future. Therefore, individual POTWs are evaluating the individual mass allocations in terms of current and future mass loads. Situations are different for individual POTWs, depending on remaining unused permitted capacity, future growth projections, wet weather or economy-based impacts on flows, etc. It is difficult to derive a rational approach for individual mass allocations that is fair and equitable. Since these allocations are not essential to TMDL implementation, the most obvious option is to delete these individual allocations from the TMDL.

RWQCB staff in their February 14, 2004 response to EPA comments on the prior TMDL report, stated (page 8) that they were considering either concentration or individual WLAs as triggers. The report should stay with the original recommendation (below) to just use concentration triggers. Furthermore staff should proceed with the effort to “engage USEPA and stakeholders” in this decision making process as outlined in the response to comments below.

*“WQBELs can be numeric or narrative, or a combination of numeric and narrative requirements. We are not proposing triggers in lieu of WQBELs. We propose issuing a mercury-specific NPDES watershed permit to wastewater dischargers that implements the wasteload allocations. This permits would include a mass load numeric WQBEL equal to the aggregate wasteload allocation. We would also include a number of narrative provisions, as we do with our existing permits. **For added protection, we are proposing numeric***

*concentrations that will trigger certain narrative requirements. Alternatively, we are considering use of the individual WLAs as triggers. We believe this approach to WQBELs is acceptable and desirable, particularly in the context of solving a complex water quality problem. We will engage USEPA and stakeholders in development of permit specifications including consideration of individual numeric limits along with incentives and credits for offsets and protection against unwarranted enforcement. We propose to conduct this effort in parallel with moving forward with the proposed TMDL package.”(emphasis added)*

## **2. Revise the POTW Group Allocation to Include a Specific Allocation for Growth.**

It is important that the allocation contain an increment for community growth and development. From the standpoint of Bay impacts or the attainment of mercury sediment targets, a growth allocation will have a de minimus impact on the ultimate attainment of the targets set in the TMDL. From the standpoint of NPDES permit compliance, the magnitude of this allocation is vitally important. The current version of the staff report recommends a group allocation of 14 kg/yr, based on an annual average POTW mass load estimate of 10.8 kg/yr and an increment of 3.2 kg/yr (through use of a standard error statistic) to address interannual variability. As has been discussed with Regional Board staff, the annual average mass load value just to reflect current conditions should be increased to 11.4 kg/yr to correct mathematical errors. This estimate is approximately 1 kg/yr less than the estimate used to develop the 17 kg/yr pooled allocation in the last Regional Board staff report that included an increment to account for ABAG projected year 2025 growth.

The City also requests that the staff report and Basin Plan amendment specifically acknowledge that this pooled allocation is intended to address current loads plus a reasonable growth increment. Individual POTW service area growth estimates through 2025 were developed in a CEP funded technical report in September 2002 (*Technical Assistance in Support of Mercury TMDL Implementation Plan for SF Bay – Wastewater Facilities*, prepared by LWA for AMS). In that report, Sunnyvale’s population was projected to grow by 14% between 2000 and 2025, from 131,760 to 150,100. This is the same percentage growth rate as for the overall Bay area. Growth will likely continue beyond 2025 but no estimates were provided of that increment. Unless the Regional Board is able to overcome the anti-backsliding concerns expressed in our attorney’s comment letter, there must be a further allocation (or other appropriate means) to meet growth beyond the 2025 date.

It is an important policy precedent that the mercury TMDL explicitly acknowledge the need for a future growth increment for POTWs. This sends the message that the POTW loads are not significant and that minor increases in loads are allowable under the Clean Water Act. The current document indicates that future growth can be accommodated through offsets, signaling a return to the policy precedent that USEPA unsuccessfully tried to establish in NPDES permit that would restrict any increases in loads of any magnitude for 303(d) listed parameters. This approach is unacceptable, from a policy perspective, since offset feasibility is yet to be established.

The first bullet on the top of page 84 of the TMDL staff report appears to imply that growth related flow would be viewed as "new sources of mercury" and have to be offset. There is no offset program, only a discussion on p. 83 of potential elements of one and that interested parties "may submit detailed proposals for such an approach..." Until the science is better understood about relative bioavailability, localized impacts, etc., we foresee many challenges in developing appropriately conservative offset ratios and other fundamental aspects of an offset program that would have a hope of becoming a reality.

One of the independent peer reviewers (Dr. David Sedlak, UC Berkeley) of the TMDL technical report also suggested including a specific growth increment allocation:

*"The load allocations do not contain a term to allow for future growth, as often is done in TMDLs. One potential implication of this approach is that it could place caps on the volume of effluent discharged by wastewater treatment plants. Because the allocation for wastewater treatment plants is based upon current discharges, a treatment plant in a rapidly growing area might have to engage in water recycling or install advanced wastewater treatment processes to comply with this TMDL. Although water recycling and advanced treatment are reasonable objectives, I am not sure that it would be appropriate to require such measures as part of this particular TMDL program. Although the volume of wastewater discharged by the sum of all of the dischargers may not be increasing rapidly, I suggest that the authors address the issue of future increases in wastewater effluent flow in more detail. "*

The RWQCB staff response to Dr. Sedlak's comment inappropriately and without evidence dismissed the need for a growth allocation.

*"26. We chose not to allocate a portion of the TMDL for future growth. The Association of Bay Area Governments' year 2025 growth projections for the Bay Area suggests that there will be modest (~14% region wide) population growth over that period. We believe modest influent flow increases could be offset both by slight improvements in treatment efficiency and increased water re-use; therefore, the mercury allocations will not pose a compliance challenge to wastewater treatment plants or necessitate flow limitations. If growth becomes a concern, for example 15 to 20 years from now, we expect to know more about how our mercury control efforts are working and have a more solid basis for determining if modifications to the wastewater allocations are appropriate. "*

There is no evidence provided to support the assertion that increased treatment efficiency and increased water reuse are in fact achievable and that they are capable of fully offsetting increased loading from growth. The CEP report cited above did not include any assessment of potential reductions from treatment process optimization, presumably since most POTWs are normally operated to produce as high a quality effluent as they can with their existing facilities (to "comfortably" comply with all effluent limitations). Water recycling is expensive and individual projects still face institutional obstacles, not the least of which continuing lack of adequate public acceptance to easily expand recycled water systems. The CEP report estimated that 20,000 acre-feet were recycled region-

wide in 1999. That volume removed an estimated 0.1 to 0.4 kg/yr of mercury. A BARWRP proposed 125,000 acre-feet per year regional water recycling project would cost \$79 million per year and remove about 0.8 kg/yr if fully implemented.

Additional wastewater not accounted for in the above cited estimates is that generated by new jobs that are filled by non-bay area residents. A better economy may attract more tourists and associated wastewater. The movement towards "smart growth" may result in higher population densities and more population growth in the bay area than ABAG is now projecting.

Contrary to staff assertions, it is more likely than not that there is at least a one to one relationship between population growth and loading. Sunnyvale annually conducts wastewater collection system monitoring and prepares a report on the sources of copper, nickel and mercury. In 2003, the largest source of mercury was the residential section (73% of the total). The next largest source was commercial (15%), followed by industrial (8%), "other" (2.1%) and water supply (1.8%). Human waste, laundry grey water, and household products are major sources of mercury.

If the relative proportions of residential, commercial, and industrial wastewater remain as they are now, one would expect future influent mercury concentrations to remain about the same as it is now. Therefore, assuming that other known influent sources of Hg remain controlled, domestic wastewater flow and associated mercury loading will go up in proportion to the net population increase. If the percent residential flow increases, the concentration could increase. Effluent concentration is not expected to change, given that the WPCP already removes over 98% of the influent mercury. As noted in the CEP report cited above, it is an invalid, but commonly held assumption that a reduction in influent concentration results in an equivalent reduction in effluent concentration.

### **3. Use a 5-year averaging period to assess compliance with the POTW group allocation.**

The prior version of the staff report had a five-year averaging period for wastewater sources. The current version of the staff report and Basin Plan amendment has a one-year averaging period for wastewater but a five year averaging period to account for allocations for Central Valley and Guadalupe River watershed loads. No rationale was given for the change to a one-year averaging period. The use of the five year averaging period is to account for inter-annual variability in load due to rainfall-induced flow conditions. The five year averaging period is needed for POTWs to account for inter-annual variability of wastewater flows. Use of a five year averaging period to evaluate the load from POTWs is appropriate and is beneficial to eliminate concerns regarding wet season or economic driven fluctuations in plant flows. It is consistent with the calculation method used in the derivation of the current POTW load estimate. It is also consistent with the time-frame for recovery of the bay, a long term process, and as such the compliance method should not over react to one year's values.

#### **4. The Report Must Recognize That There are Very Limited if any Mass Reduction Options Available to Advanced Secondary Treatment Plants such as Sunnyvale**

There are no reasonably feasible options for reducing Sunnyvale's mass discharge of mercury given their significant past efforts at reducing overall metals discharges. Sunnyvale evaluated this same issue in an EOA October 18, 2002 memo titled "Draft Sunnyvale Mercury Mass Limit Calculations Case Study" (copy attached). This memo was provided to Board permitting staff as part of the 2003 NPDES permit reissuance process. Excerpts are provided below. The memo documented, and Board staff agreed, that there would likely be future exceedances of the current performance based mass limit under consideration at that time of 0.096 kg/yr. Note that exceedances were predicted for a value (later modified) that was 16% greater than the 0.083 kg/yr individual WLA now being proposed for Sunnyvale.

Studies in the region and nationally (e.g., by Palo Alto and by AMSA, as cited in the CEP report noted above) have typically found the majority of mercury to be coming from dental offices and from human waste (in food and from amalgam filling erosion). Sunnyvale found that 73% of the influent mercury loading was coming from residential sources in the City. Given the current low effluent concentrations it is unlikely that concentrations could be lowered significantly through further plant optimization. Sunnyvale effluent total suspended solids concentrations are in the 8 mg/l range (less than 50% of the monthly average effluent limit of 20 mg/L).

The City has mature pollution prevention and pretreatment programs. Sunnyvale began implementing its Federal Pretreatment Program in the mid-1980's. During 1990-1994 the City implemented increased waste minimization efforts following issuance on NPDES permit Order Nos. 88-176 and 90-70. This included implementation of Reasonable Source Control Measures (RSCMs) identified by industrial users in their Mass Audit Studies. The remaining RSCMs were implemented during 1995-1997. The City has already included dentists in its pollution prevention efforts and is continuing its efforts to deliver and redeliver BMP type information to dentists.

Work by AMSA, cited in the CEP report above, estimated that implementation of pollution prevention and source control measures might provide influent load reductions of 26 to 33 percent (perhaps less depending on the extent of control measures already in place). However, after full implementation, effluent concentrations were only predicted to be reduced by 2% to 3%.

The regression graph of Sunnyvale influent and effluent mercury concentrations in Figure A-2 of the EOA 10/18/02 memo cited above shows this same situation, that influent and effluent concentrations are not closely related. A decrease in influent concentrations, through pollution prevention, will not necessarily lead to a discernible decrease in effluent concentrations. Given that the POTW achieves approximately 98% mercury reduction, it would take approximately a 50 ng/L increase in influent concentration to result in a 1 ng/l effluent concentration decrease. A decrease in influent concentrations

could result in reduced biosolids mercury concentrations which would reduce loadings to landfills and landspreading operations and possibly the atmosphere via volatilization.

The City has been proactively pursuing water recycling as a means of reducing overall discharges to the Bay since the early 1990's. Sunnyvale has to date invested over \$20 million in water recycling production and distribution facilities. The City reports on its recycled water deliveries and efforts at expansion in its March 15 Annual Report, required as a condition of its water recycling permit. Recycled water production has exceeded 1 mgd during peak summer months and averaged about 304,000 gpd on an annual average basis during 2001.

The City has completed a Water Recycling Master Plan that it keeps updated and uses as part of its efforts to incrementally expand to additional urban irrigation sites within its core distribution network. The Master Plan found that it would cost the City approximately an additional \$20 million to extend its existing distribution system to the remaining major landscape irrigation sites in the City. That expenditure would achieve approximately an additional 1 mgd on an annual average basis. One mgd diverted, containing 4 ng/L mercury, would remove approximately 0.0055 kg/yr from the amount discharged to the bay. Note that the 0.0027 kg/yr in rainfall falling on the ponds that is removed by the secondary and tertiary treatment processes (at minimal incremental cost) is about 50% of the 5.5 grams/yr removed from the bay by this 1 mgd of additional water recycling.

The City already has a water conservation program in place and believes that most of the significant reductions have already been achieved. Recent activities include a showerhead/faucet aerator replacement program (free to residents), water-wise house call program (free to residents), residential clothes washer rebate Program-Energy Star®, commercial clothes washer rebate Program-Energy Star®, ULFT replacement programs (multi-family units, low income, elderly, disabled and commercial facilities), hotel water conservation program, irrigation technical assistance program and Project WET (Water Efficient Technologies) for industry.

The City has relatively low amounts of I/I, previously estimated to be only 5% of the City's effluent flow. The City completed a collection system evaluation survey in 2001 that identified potential projects for their capital improvement program.

While excessive I/I is not a problem, the City is adversely impacted by rainfall in another uncontrollable way. The SFEI San Francisco Bay Atmospheric Deposition Study Part I: Mercury (July 2001) estimated the average mercury concentration in precipitation in the Estuary to be about 8.0 ng/L (0.008 ug/L). The highest concentration monitored in the effluent during the last three years was 8 ng/L, while the average was less than half that contained in rainfall. The WPCP includes 400 acres of secondary treatment ponds. If the LSB receives approximately 12 inches of rainfall per year, that translates to an input of about 400 acre-feet or about 180 MG/year of flow containing 8 ng/L of mercury. Given the average effluent concentration of 0.0038 ug/L, about half of this rainfall induced

mercury loading (0.0027 kg/yr) that would otherwise go to the bay (if the ponds were absent) is removed by the WPCP treatment processes.

Since effluent concentrations appear unlikely to decrease further, and no other practicable options for mass offsets currently appear to exist, the only way to guarantee 100 % compliance with the proposed individual WLA appears to be to restrict flow by restricting wastewater producing growth.

#### **5. Provide Definitive and Retroactive Credit for Load Reduction Activities.**

The current document is non-specific regarding the framework or mechanisms for providing mass load credits/incentives to agencies that implement projects to reduce the mass input of mercury to the Bay (e.g. recycling, pollution prevention, etc.). The report requires POTWs to prepare an annual report “including mercury loads avoided through program activities unrelated to normal treatment” (page 75) but no corresponding link to how the avoided loads would be credited to the POTW. The report contains only a very weak section on potential pollutant trading (page 83): “Interested parties may submit detailed proposals for such an approach, ...” A mechanism should be provided whereby Sunnyvale could get credit for the mercury removed from incident rainfall by its secondary and tertiary treatment processes. Similar credits may be appropriate for POTWs that can demonstrate removals of rainfall induced I/I.

#### **6. Provide More Comprehensive and Quantitative Information on Economic Costs in the Regulatory Analyses Section**

The City believes that the TMDL report needs to include more information on the potential total regional costs for additional pollution prevention/source control, effluent filtration, effluent reverse osmosis treatment, and water recycling. This is necessary as part of the alternatives analyses to more clearly provide the public with a fuller appreciation of the magnitude of potential expenditure of public funds under worst case scenarios for POTWs. While use of filters and reverse osmosis on a Bay-wide basis is described as unlikely to be required, the public should be aware of the massive costs if it were to be required (\$909 million per year plus brine disposal). Much of the analysis was already developed for and included in a CEP September 2002 report (*Technical Assistance in Support of Mercury TMDL Implementation Plan for SF Bay – Wastewater Facilities, Table 1a-1. Matrix of Mercury Load Reduction Scenarios*, prepared by LWA for AMS).

STATE OF CALIFORNIA  
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

STAFF SUMMARY REPORT (Linda Rao)  
MEETING DATE: JUNE 18, 2003

ITEM: 8, 9,10

SUBJECT: Cities of San Jose and Santa Clara, Water Pollution Control Plant,  
Santa Clara County- Hearing to receive testimony on reissuance of  
NPDES Permit

City of Palo Alto, Regional Water Quality Control Plant, Santa  
Clara County- Hearing to receive testimony on reissuance of  
NPDES Permit

City of Sunnyvale, Water Pollution Control Plant, Santa Clara  
County- Hearing to receive testimony on reissuance of NPDES  
Permit

CHRONOLOGY: May 2003 – NPDES Permit Reissuances Status Report to the  
Board  
June 1998 – Permits Reissued  
June 1993 – Permits Reissued

DISCUSSION:

Due to last minute meetings and negotiations with the Cities of San Jose, Palo Alto, and Sunnyvale, the Tentative Orders for each will be released in mid-June. The June Board Workshop will be continued for July, to allow adequate review time. We recommend that the Board receive testimony at the July Workshop, and take action on permit reissuance in August.

Process and Schedule

These permits were developed using the WMI stakeholder process which included participation in over 25 meetings, review by the WMI of two administrative drafts of NPDES permits for the three Cities, and additional meetings regarding discharger specific issues and complex technical topics.

At the May Board meeting, Board staff presented a status report of the reissuance of the three NPDES permits and identified three major outstanding issues (mercury, copper and nickel effluent limits and habitat mitigation). This summarizes progress achieved thus far.

Issues presently under discussion include mercury mass limits, copper and nickel limits, and a habitat issue unique to the City of San Jose's permit.

#### Mercury Mass Limits:

At the May Board meeting, the South Bay Dischargers proposed that mercury mass limits not be included at all. Instead they propose alternatives to the interim mass limit, such as a mass trigger paired with aggressive pollution prevention efforts and watershed-based mercury studies designed to address TMDL information needs.

Since the May Board meeting, Board staff have met with the South Bay dischargers and reached consensus on the approach for setting interim mass limits (see Table A). The new proposal to address interim mass limits include a mercury interim mass limit effective only during the dry weather, aggressive pollution prevention efforts, and implementation of a watershed-based mercury study.

#### Copper and Nickel Limits:

At the May 2003 Board Meeting, the Dischargers contended that effluent limits are not necessary. At present, Dischargers have tentatively agreed to the inclusion of effluent limits in the permits under the condition that with new information, the Regional Board will reevaluate the need for effluent limits for copper and nickel.

#### South Bay Habitat Issues:

Since January 2003, staff has coordinated meetings with the City of San Jose, U.S. Fish and Wildlife Service, California Department of Fish and Game, environmental groups and interested parties to bring closure to historical mitigation requirements unique to the City of San Jose. These meetings have been productive and will continue between agencies to ensure a permit consistent with the Endangered Species Act.

Staff are pleased that San Jose has offered an alternate wetlands mitigation proposal, and will require the City to continue working with the USFWS, CDFG and RB to finalize details. After permit adoption, Regional Board staff will present a resolution for an alternate wetlands mitigation project to the Board for its adoption.

RECOMMENDATION: Continue the Items for July

File Nos. 2189.8011, 2189.8014, 2189.8018 (LR)

Appendices:

#### Tables

Table A: South Bay Mercury Mass Limits

Table A: South Bay Mercury Mass Limits

<b>City Facility</b>	<b>Interim Concentration Limit (µg/L)</b>	<b>Current Mercury Mass Limit (kg/year)</b>	<b>Proposed Interim Mercury Mass Limit<sup>1</sup> at May Board Meeting (kg/year)</b>	<b>New Proposed Interim Mercury Mass Limit<sup>2</sup> (kg/year) (dry weather limit + pollution prevention + watershed based mercury study)</b>	
<b>San Jose and Santa Clara</b>  (Design Flow Capacity- 167 MGD)	0.012	32	0.72	2.77	Investigating sources of methylmercury within their treatment process, and feasibility analysis of reducing methylmercury
<b>Sunnyvale</b>  (Design Flow Capacity- 29.5 MGD)	0.012	25	0.12	0.50	Evaluation of treating stormwater elevated in mercury at their treatment plant
<b>Palo Alto</b>  (Design Flow Capacity- 39 MGD)	0.023	11	0.31	1.24	Implementation of advanced pollution prevention technologies at dentist offices

- 1 Calculated using the average plus 3 standard deviations (or the 99.87 percentile). The data set includes the past three years of effluent ultraclean mercury data and monthly average flows.
- 2 The new proposal includes an interim dry weather mass limit and a requirement to do a special pollution prevention project addressing mercury reduction within the watershed. The new limit is calculated using the dry weather design flow, multiplied by the interim mercury concentration. The design flow is different for each discharger, the interim mercury concentration is the more stringent of current plant performance or existing permit limitations.

**TO:** Lorrie Gervin/Dave Grabiec, City of Sunnyvale

**FROM:** Kristin Kerr/ Tom Hall

**DATE:** **Initial Draft** - October 8, 2002  
**Revised Draft** - **October 18, 2002**

**SUBJECT:** **Draft Sunnyvale Mercury Mass Limit Calculations Case Study**

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### **Background**

The current (1998) South Bay NPDES permits contain mass limits for several toxic constituents pursuant to SWRCB Order 90-05. That Order directed that:

“The limits should be calculated by multiplying the 1989 annual mean effluent concentration by the 1985 -1988 annual average flow. Because the dischargers will be using lower detection limits, they should be able to comply with mass loading limits, based on mean loading. Further, when evaluating compliance with these mass emissions, the Regional Board should consider variability due to wet and dry weather.”

The 1998 (and 1993) South Bay permits contained footnotes to the mass limits describing in more detail how they were to be calculated and reported. Footnote 2 to the mass limits addressed the issue in Order 90-05 about wet weather variability:

“For performance based mass limits: Because mass may increase during heavy rainfall years and wet year data were not considered in the development of these limits, exceedances during wet weather years will be evaluated separately.”

Citizens for a Better Environment, San Francisco BayKeeper, and CLEAN South Bay filed petitions for the SWRCB to review the three 1998 South Bay Permits. The SWRCB responded to the petitions in Order WQ 99-09 in October 1999. Order WQ 99-09 cited the following relative to establishing mass limits for POTWs:

“The EPA permitting regulations generally require permit issuers to express effluent limitations in terms of mass, but do not provide guidance on how to establish mass limits.[46] *For publicly-owned treatment works, like the South Bay dischargers’ treatment plants, the regulations only provide the general direction that effluent limitations be based on design flow.*[47] Thus, the permitting issuer can use best professional judgment to establish mass limits.[48]” (emphasis added)

{Footnote 46: 40 C.F.R. Section 122.45 (f)(1), Footnote 47: 40 C.F.R. Section 122.45 (b)(1), and Footnote 48: WL 433759 at 12 (EPA)}.

The 1998 South Bay permits included numeric effluent goals in lieu of WQBELs for several pollutants that had analytical detection limits above the WQBELs. Order WQ 99-09 upheld that “the RWQCB had discretion to decide that it could not determine reasonable potential for these pollutants.” The Order also stated that:

“The Regional Water Board’s approach is consistent with EPA guidance. EPA recommends, when a permitting authority is unable to determine reasonable potential based on effluent data, that the authority require further testing to develop the necessary data [71]. The State Water Board’s proposed policy implementing the CTR takes a similar approach in cases where effluent data are insufficient to determine whether an effluent limitation is needed to control a pollutant [72].”

{Footnote 71: See Technical Support Document, fn. 7, supra, p. 5; Guidance for NPDES Permit Issuance, fn. 36, supra, p. 10; Footnote 72: See Draft Statewide Policy, fn. 37, supra, proposed Section 2.2.A.}.

### **Current Performance Based Mass Effluent Limits**

The South Bay permits have included mass based limits for several toxics pursuant to SWRCB WQ Order 90-5. Interim performance-based mass limitations have been included in other NPDES permits for certain 303(d)-listed bioaccumulative pollutants, primarily mercury, since 1998 (for background history see EOA June 30, 1998 memo “Mercury Mass Loading and Trigger Issues” to Shin-Roei Lee, RWQCB). The interim mass-based loading limit (interim mass limit) for mercury has most frequently been calculated as the mean plus three standard deviations (99.87<sup>th</sup> percentile) of the 12-month moving average mass loading from the most recent three years effluent data. When these performance based limits were first calculated, the datasets often included some high detection limit and/or non-ultra clean values that tended to skew the mass limits higher. Near-term compliance was less of an issue with limits calculated with non-ultra clean data.

Currently, most POTWS, including the South Bay POTWS, have at least three years of ultra-clean mercury effluent concentration data. In these cases, a performance based mass limit represents true plant performance without any “buffer.” An interim mass limit was calculated for Sunnyvale using the RWQCB’s standard spreadsheet and effluent concentration and flow data from the 36 months April 1999 through March 2002. The flow used was calculated as the effluent discharged to LSSFB plus recycled water flow. Including the recycled water flow in the mass limit calculation has been done in the past to provide the discharger a “credit” for reductions in mercury mass discharged to the receiving water from proactively initiated water recycling.

The average monthly flow was multiplied by the average monthly mercury concentration and a conversion factor to yield an average monthly mercury mass. A 12-month moving average monthly mass was calculated from these values, and a performance-based mass limit was then determined based on the average plus three standard deviations of the moving average values. The mercury mass effluent limit calculated is 0.008 kg/month or 8 grams/month.

Sunnyvale effluent mercury concentrations ranged from 0.002 – 0.008 ug/L with an average concentration of 0.0038 ug/L and 99.87<sup>th</sup> percentile value of 0.010 ug/L. The very low values were also quite consistent, demonstrated by their standard deviation was 0.002 ug/l. Mercury concentration, effluent flow (not including recycled water) and mercury mass (monthly mass discharged) are shown below from April 1999 – March 2002 in Figure 1. These low concentrations and standard deviation reflect the existing high level of plant performance and an aggressive pollution prevention program. By

way of comparison, the RWQCB's June 2001 analysis of pooled mercury data from all secondary and advanced secondary treatment plants showed them to have 99.87<sup>th</sup> percentile mercury concentrations of 0.087 ug/L and 0.023 ug/L, respectively.

Using these same data the pooled mercury report estimated an annual average mercury mass loading from POTWs of approximately 15 kg/yr. The total loading to the bay is estimated in the Draft Mercury Source Assessment for San Francisco Bay (8/26/02) to be in the range of 940 kg/yr. By these estimates POTWs combined contribute about 1.6% of the total mercury loading to the Bay and Sunnyvale contributes about 0.01% of the total loading.

### **Potential to Exceed Possible Mass Limits**

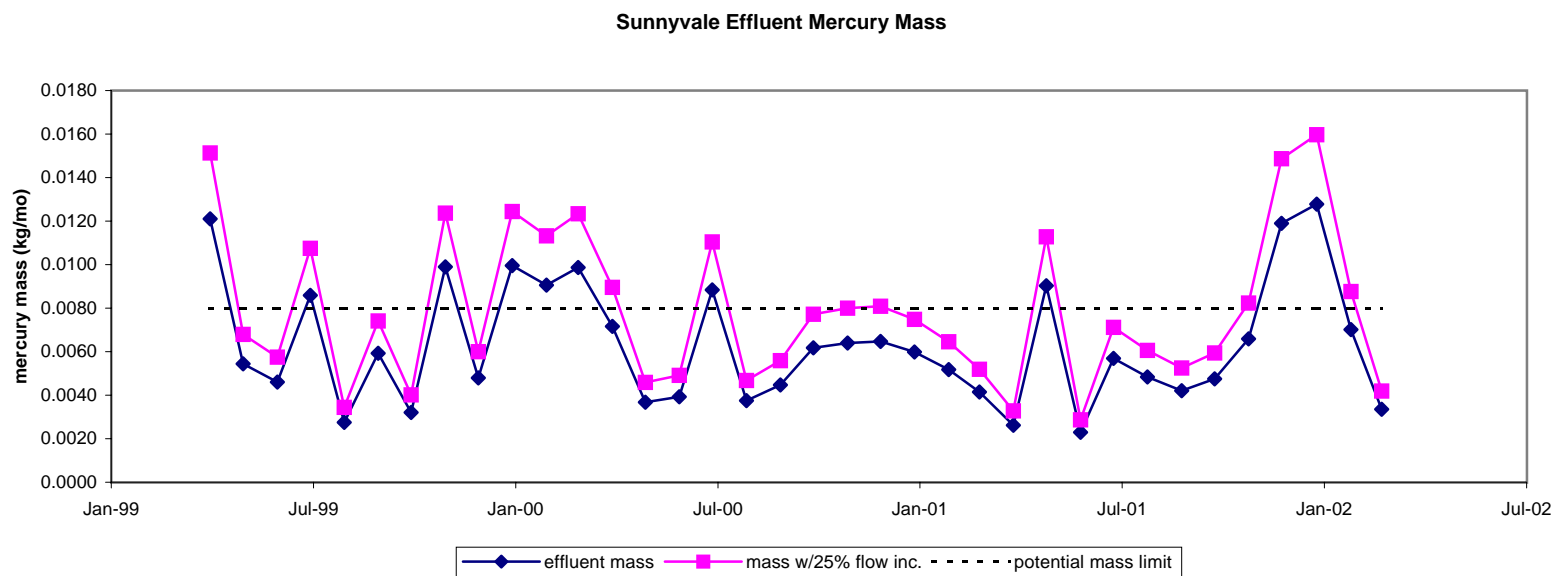
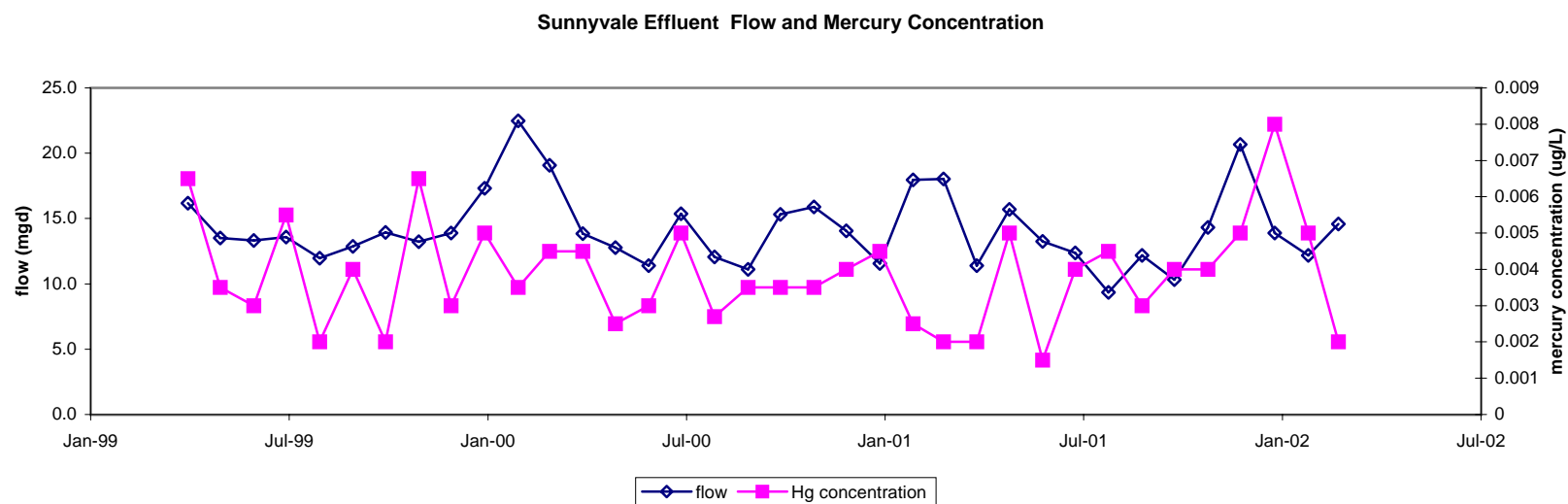
A mathematical model was used to assess the potential for the City to exceed a mass limit of 0.008 kg/mo. Assumptions made for the modeling were as follows:

- "Moving averages" can be modeled using a normal distribution. From a theoretical point of view this is a reasonable assumption, and from a practical point of view the normal distribution provides the best fit of common continuous distributions;
- Flow and concentration data between April 1999 and March 2002 are representative of those which should be expected in the future;
- Flow and concentration data are independent; and
- Reported concentrations are accurate approximations of the true concentration in the effluent.

There are two main steps to this modeling assessment. First, the 25 12-month moving average effluent flow and concentration values from the "spreadsheet model" (Appendix A Table A-1) were input into a computer simulation model to generate distributions approximating the underlying 1) actual effluent (not including recycled water) moving average flow and 2) effluent moving average concentration data. Via a method of maximum likelihood, the model then fit a distribution (mathematical representation) to those data and generated a mean and standard deviation. In the second step, the user inputs the number of trials to run and the model then samples random pairs of flow and concentration values from the underlying flow and concentration distributions using a process called Monte Carlo simulation to calculate the distribution of mass values and the certainty (probability) in percent that the mass values will be below the specified maximum mass value (i.e. the potential mass limit).

This simulation approach is slightly different from the "spreadsheet model" approach that uses actual flow and concentration data and calculates moving averages of the resultant mass values. The simulation approach is believed to be equally or more conservative since it uses both moving average flow and moving average concentration values to derive the distribution of mass values. The use of one and particularly two moving averages reduces the effects of extreme individual values.

**Figure 1. Sunnyvale Effluent Flow, Mercury Concentration and Mercury Mass**



Results from the Monte Carlo simulations are shown graphically in a forecast chart that shows the range of possible outcomes (mass) and the likelihood and frequency of achieving each range (Figure 2). For each of the forecast charts shown below 1,000 random trials were run. The chart left hand Y-axis shows the probability of a value falling within a given mass interval normalized to the number of trials (1,000) run. The chart right hand Y-axis shows the frequency that a value within a given mass ranged occurred. The value at the top right of the chart labeled “outliers” is somewhat of a misnomer since it refers only to the number of values not shown on the chart based on the display range selected for the X-axis. No values (outliers) were censored from the dataset in any of these analyses.

At the bottom of the chart, the certainty of the generated mass values falling within a user specified range is given. For these simulations, the user range selected was from zero up to the previously derived mercury interim mass limit (the maximum of this range). The program then shows the certainty, in percent, that the distribution of mass values generated from the 1,000 trial runs will be below the mass limit value entered.

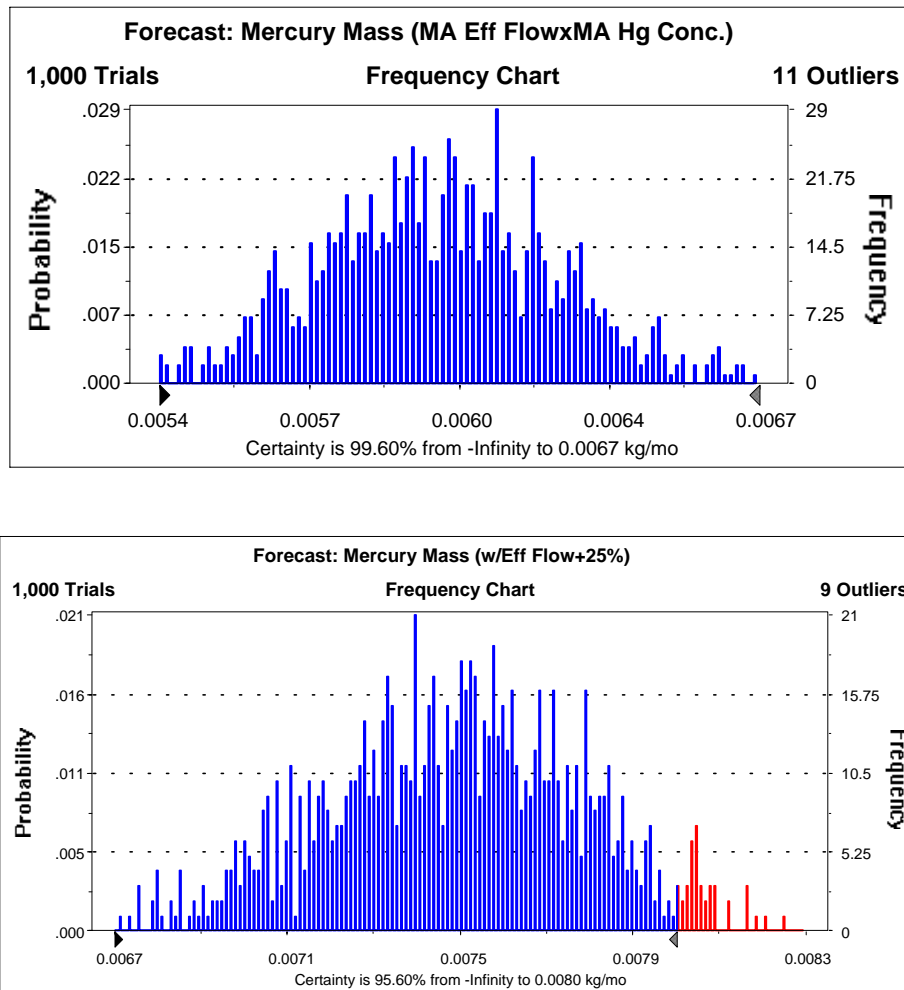
**Existing Conditions Simulation** The model was run as described above with the simulation randomly taking a value from the 12-month moving average flow distribution and multiplying it by a random value in the 12-month moving average mercury concentration distribution to determine a mass. This was done 1,000 times to produce the mercury mass frequency distribution shown in Figure 2. The top-most frequency distribution plot in Figure 2 shows that Sunnyvale would have a 0.4% probability of exceeding the potential 0.008 kg/mo mercury mass limit if similar effluent flow and concentration conditions occur in the future as represented by April 1999 to March 2002 conditions.

This modeling analysis does not take into account potential worse case situations such as where several wet weather high flow months might occur in a row with concurrent elevated I/I and reduced recycled water demand.

**25% Flow Increase Simulation** To determine how sensitive the possible mass limits are to increases in flow, a second set of simulations were generated based on an assumed 25% increase in flow. Each of the 25 12-month moving average flow values was multiplied by 1.25 and the resulting flows entered into the simulation model. The concentration values were not changed. The average effluent flow from April 1999 – March 2002 is 14.2 mgd. The simulated 25% increase in flow throughout the three year period would be equivalent to average flow of 17.8 mgd. Therefore, this simulation can be viewed as representing some unspecified three year time period in the future when the average flow was 17.8 mgd and the individual monthly moving average concentration values were the same as had occurred during April 1999 – March 2002. As shown in the lower plot in Figure 2, if flow increased by 25% the potential mercury mass limit would be expected to be exceeded about 4.4% of the time.

**Time Series Moving Average Mass Comparisons** Figure A-1 in Attachment A presents a time series plot of the actual 25 12-month moving average mass discharge values (i.e. with credit for reclamation). This represents how plant compliance would have been evaluated if the proposed limit had been in place during April 1999 – March 2002 (lower line). The actual flow values in the spreadsheet model were then multiplied by 1.25 to provide a projection of future performance and compliance on a moving 12-month moving average basis assuming no other changes occurred except for the assumed 25% increase in flow. The upper time series plot reflecting the 25% flow increase exceeds the 0.008 kg/mo limit in 10 out of 25 months and is just fractionally below the limit in two additional months.

**Figure 2. Mercury Mass Frequency Charts Simulated with 12-Month Moving Average Flow and 12-Month Moving Average Concentration**



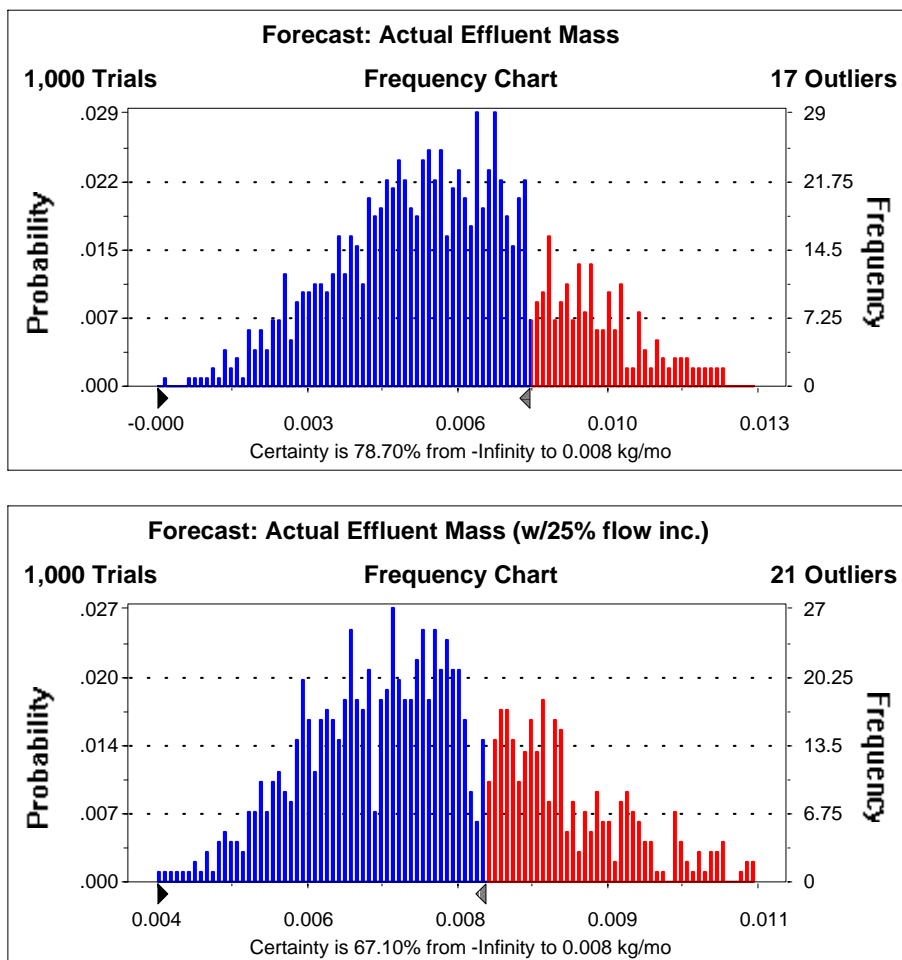
**Actual Flow and Concentration Simulation** The simulation was also run using actual effluent flow and mercury concentration distributions, instead of the 12-month moving average values used above, to calculate an effluent mass distribution. The intent was to generate an estimate of the actual underlying effluent mass distribution for comparison with the 36 actual measured values of monthly mass discharged as plotted in Figure 1 and shown in the mass limit calculation Table A-1 in Appendix A.

As shown in Figure 3, without the 12-month moving average “smoothing,” the simulation projects a 21.3% probability of exceeding the potential 0.008 kg/mo mercury mass limit if conditions remain the same as represented by April 1999 – March 2002 flows and concentrations. During these 36 months the actual measured mass discharged exceeded 0.008 kg/mo 10 times or about 27.8% of the time. This approach to mass simulation thus slightly underestimates, compared to the actual historic data, the frequency distribution of mass discharges greater than 0.008 kg/mo.

**Actual Concentration with Actual Plus 25% Flow Increase Simulation** To determine how sensitive this method of projecting actual mass discharges would be to increases in flow, the simulation was also

run based on an assumed 25% increase in the actual flow values. If flow increased by 25%, the potential mercury mass limit would be expected to be exceeded about 32.9% of the time if compliance were evaluated on a month by month basis (instead of a 12-month moving average basis).

**Figure 3. Mercury Mass Frequency Charts Simulated Using Actual Monthly Flow and Monthly Average Concentration**



**Concentrations Needed to Exceed Limit** Another method of intuitively investigating the potential for exceedance of the mass limit is presented in the Attachment A Table A-2 titled City of Sunnyvale Mass Limit Evaluation. There, the effluent flow values from April 1999 through March 2002 were ranked from the lowest to the highest. The mercury concentration required to generate a mass value equal to the mass limit was then determined for each flow value. These resultant concentration values ranged from 0.0031 – 0.0074 ug/L. Note that these concentration values fall within the range of actual concentration values measured from April 1999 through March 2002, of 0.002 – 0.008 ug/L. This indicates that on an individual monthly basis, concentrations could occur that would result in an individual mass discharge at or above 0.008 kg/mo.

**Effluent Flow vs Concentration** Figure A-2 in Attachment A plots effluent flow versus effluent mercury concentration. The regression line drawn through this scatterplot shows a very low correlation

coefficient ( $R^2$ ) value of 0.011. This indicates that there is essentially no relationship between effluent flow and concentration. A similar plot in Figure A-3 in Attachment A shows similar results when influent mercury concentration is plotted against effluent concentration. This plot has an even lower ( $R^2$ ) value of 0.003 indicating that within the range of values in the dataset, simply lowering influent concentrations will have no measurable effect on effluent concentrations.

An additional factor to consider in assessing the robustness of mass limits calculated using these data and the proposed approach is that most of the measured values are within a factor of three of the 0.002 ug/L detection limit. The precision and accuracy of analytical results typically decreases considerably as the concentration present approaches the detection limit.

One conclusion that can be drawn from the above observations is that it appears possible that certain flow and concentration pairings can occur just by random chance. During an extremely wet winter, several high flow months in a row could occur. Since flow and effluent concentration have been shown to be unrelated, if high concentration values (relatively speaking and within the range of those experienced in the past) were concurrently to occur due to chance, this in and of itself could potentially result in exceedance of the mass limit.

### **Mass Reduction Options**

There appear to be relatively few reasonably feasible options for reducing Sunnyvale's mass discharge of mercury given their significant past efforts at reducing overall metals discharges. Other studies in the region and nationally have typically found the majority of mercury to be coming from dental offices and from human waste (in food and from amalgam filling erosion). As noted above, given the current low effluent concentrations it is unlikely that concentrations could be lowered significantly through further plant optimization. Sunnyvale effluent total suspended solids concentrations are in the 8 mg/l range.

The City has mature pollution prevention and pretreatment programs. The City has already included dentists in its pollution prevention efforts and is continuing its efforts to deliver and redeliver BMP type information to dentists. The regression graph of influent and effluent mercury concentrations in Attachment A shows a low  $r$  squared value. This indicates that influent and effluent concentrations are not closely related and a decrease in influent concentrations, through pollution prevention, will not necessarily lead to a decrease in effluent concentrations. It would likely result in reductions in biosolids mercury concentrations.

The City already has a water conservation program in place and believes that most of the significant reductions have already been achieved. Recent activities include a showerhead/faucet aerator replacement program (free to residents), water-wise house call program (free to residents), residential clothes washer rebate Program-Energy Star®, commercial clothes washer rebate Program-Energy Star®, ULFT replacement programs (multi-family units, low income, elderly, disabled and commercial facilities), irrigation technical assistance program and Project WET (Water Efficient Technologies) for industry.

The City has relatively low amounts of I/I, previously estimated to be only 5% of the City's effluent flow. The City completed a collection system evaluation survey in 2001 that identified potential projects for their capital improvement program.

While excessive I/I is not a problem, the City is adversely impacted by rainfall in another uncontrollable way. The SFEI San Francisco Bay Atmospheric Deposition Study Part I: Mercury (July 2001) estimated the average mercury concentration in precipitation in the Estuary to be about 8.0 ng/L (0.008 ug/L).

The highest concentration monitored in the effluent during the last three years was 8 ng/L, while the average was less than half that in rainfall. The WPCP includes 400 acres of secondary treatment ponds. If the LSB receives approximately 12 inches of rainfall per year, that translates to an input of about 400 acre-feet or about 180 MG/year of flow containing 8 ng/L of mercury. Given the average effluent concentration of 0.0038 ug/L, about half of this rainfall induced mercury loading that would otherwise go to the bay (if the ponds were absent) is removed by the WPCP.

The City has been proactively pursuing water recycling as a means of reducing overall discharges to the Bay since the early 1990's. Sunnyvale has to date invested over \$20 million in water recycling production and distribution facilities. The City reports on its recycled water deliveries and efforts at expansion in its March 15 Annual Report, required as a condition of its water recycling permit, Order No. 94-069. The City has completed a Water Recycling Master Plan that it keeps updated and uses as part of its efforts to incrementally expand to additional urban irrigation sites within its core distribution network. As shown on the attached Mass Limit worksheet, recycled water production has exceeded 1 mgd during peak summer months and averaged about 304,000 gpd on an annual average basis during 2001.

Since effluent concentrations appear unlikely to decrease further, and no other practicable options for mass offsets currently appear to exist, the only way to guarantee 100 % compliance with a mercury mass limit calculated based on recent performance appears to be to restrict flow by restricting wastewater producing growth.

### **Mercury Regulatory Alternatives**

There are several variables that can be manipulated to craft a "limit". Dialogue is needed on what it is that the "limit" is really desired to achieve to help narrow the range of feasible alternatives.

- 1) Flow: existing, dry weather only, existing plus increment, design, ...
- 2) Concentration: existing, existing plus increment, regional, ...
- 3) Mass: existing, existing plus credits, watershed, regional, with or without concentration, ...
- 4) Offsets: local recycling, regional recycling, local/regional mines, ...
- 5) Action Plans: monitoring/goals, baseline activities (P2), triggers, phased actions, ...
- 6) De Minimis: concept, thresholds, ...
- 7) Others

Table 1 presents some of these options for calculating interim mass limits.

**Table 1. Interim Mass Limit Options**

	<b>Calculation</b>	<b>Mass (kg/mo)</b>
Current Average	Avg (effluent flow x Hg conc.)	0.006
Current Maximum	max (effluent flow x Hg conc.)	0.013
Current 99.87th%ile	Avg (effluent flow x Hg conc) + 3 x st. dev. (effluent flow x Hg conc)	0.015
12-Month MA 99.87th%ile	Avg (12-month moving average mass) + 3 x st. dev. (12-month moving average mass)	0.008
Design Q x Avg Conc	29.5 mgd x avg Hg conc.	0.013
Design Q X Max Conc	29.5 mgd x max Hg conc.	0.027
Design Q x 99.87th%ile	29.5 x (avg Hg conc. + 3 * st. dev. Hg conc)	0.028
Design Q x Pooled (23ng/L)	29.5 mgd x 0.023 ug/L	0.078
Note: A conversion factor was used in the calculations to convert mgd/ug/L to kg/mo (3.785*30.42/1000).		

## **ATTACHMENT A**

**Table A-1 Effluent Mass Limit Calculation Worksheet**

**Table A-2 City of Sunnyvale Mass Limit Evaluation**

**Table A-3 Sunnyvale Effluent Mercury Data April 1999 – March 2002**

**Figure A-1 Moving Average Effluent Mass**

**Figure A-2 Effluent Flow vs Effluent Mercury Concentration**

**Figure A-3 Influent Mercury Concentration vs Effluent Mercury Concentration**

**Table A-1**  
**City of Sunnyvale - Mercury Mass Limit**

<b>Date</b>	<b>Effluent Flow</b>	<b>Recycled Water</b>	<b>Total Flow MGD</b>	<b>[Hg]; ug/l</b>	<b>Mass = Flow x [Hg]; g/d</b>	<b>12-Month Avg. Mass; g/d</b>
Apr-99	16.2	0.376	16.56	0.0065	0.407	
May-99	13.5	0.818	14.32	0.0035	0.190	
Jun-99	13.3	1.518	14.84	0.0030	0.168	
Jul-99	13.6	1.240	14.82	0.0055	0.309	
Aug-99	12.0	1.149	13.11	0.0020	0.099	
Sep-99	12.9	0.891	13.77	0.0044	0.229	
Oct-99	13.9	0.713	14.65	0.0020	0.111	
Nov-99	13.2	0.368	13.60	0.0065	0.335	
Dec-99	13.9		13.89	0.0030	0.158	
Jan-00	17.3		17.31	0.0055	0.360	
Feb-00	22.5		22.48	0.0035	0.298	
Mar-00	19.1		19.07	0.0045	0.325	<b>0.249</b>
Apr-00	13.8		13.84	0.0045	0.236	<b>0.235</b>
May-00	12.8		12.77	0.0025	0.121	<b>0.229</b>
Jun-00	11.4		11.39	0.0030	0.129	<b>0.226</b>
Jul-00	15.4		15.36	0.0050	0.291	<b>0.224</b>
Aug-00	12.1		12.05	0.0027	0.123	<b>0.226</b>
Sep-00	11.1	0.492	11.60	0.0035	0.154	<b>0.220</b>
Oct-00	15.3	0.341	15.67	0.0035	0.208	<b>0.228</b>
Nov-00	15.9	0.200	16.09	0.0035	0.213	<b>0.218</b>
Dec-00	14.1	0.123	14.18	0.0040	0.215	<b>0.223</b>
Jan-01	11.6	0.146	11.72	0.0045	0.200	<b>0.209</b>
Feb-01	18.0	0.102	18.07	0.0025	0.171	<b>0.199</b>
Mar-01	18.0	0.058	18.10	0.0020	0.137	<b>0.183</b>
Apr-01	11.4	0.157	11.55	0.0020	0.087	<b>0.171</b>
May-01	15.7	0.496	16.19	0.0050	0.306	<b>0.186</b>
Jun-01	13.3	0.533	13.79	0.0015	0.078	<b>0.182</b>
Jul-01	12.4	0.807	13.19	0.0040	0.200	<b>0.174</b>
Aug-01	9.4	0.846	10.20	0.0045	0.174	<b>0.179</b>
Sep-01	12.2	0.560	12.74	0.0030	0.145	<b>0.178</b>
Oct-01	10.3	0.195	10.52	0.0040	0.159	<b>0.174</b>
Nov-01	14.3	0.085	14.41	0.0040	0.218	<b>0.174</b>
Dec-01	20.7	0.170	20.85	0.0050	0.395	<b>0.189</b>
Jan-02	13.9	0.145	14.03	0.0080	0.425	<b>0.208</b>
Feb-02	12.2	0.069	12.25	0.0050	0.232	<b>0.213</b>
Mar-02	14.6	0.348	14.94	0.0020	0.113	<b>0.211</b>
<b>Count, n</b>						<b>25</b>
<b>Maximum Moving Average value, g/d</b>						<b>0.249</b>
<b>Maximum Moving Average Mass, kg/mo</b>						<b>0.008</b>
<b>Average Moving Average Mass, g/d</b>						<b>0.204</b>
<b>Standard Deviation Moving Average Mass</b>						<b>0.023</b>
<b>Ave + 3SD, g/d</b>						<b>0.275</b>
<b>Ave + 3SD, kg/mo</b>						<b>0.008</b>
<b>Mercury Mass Emission Limit =</b>						<b>0.008 kg/month</b>

**Notes:**

[Hg] is the concentration of mercury in micrograms per liter.

Mass in g/d is the product of Total Flow, mercury concentration and a conversion factor of 3.785.

Mass is converted from g/d to kg/mo by multiplying by (1kg/1000g) and (30.42 d/mo).

Example: 0.268 g/d (kg/1000g)(30.42 d/mo) = 0.008 kg/mo

Table A-2		
City of Sunnyvale Mass Limit Evaluation		
Mass Limit=	0.008 kg/mo	
DL =	0.002 ug/L	
Effluent Flow	Hg conc. needed to calc. mass limit	% above DL of 0.002 ug/L
9.4	0.0074	272
10.3	0.0067	237
11.1	0.0063	213
11.4	0.0061	205
11.4	0.0061	205
11.6	0.0060	200
12.0	0.0058	191
12.1	0.0058	188
12.2	0.0057	185
12.2	0.0057	185
12.4	0.0056	181
12.8	0.0054	172
12.9	0.0054	170
13.2	0.0053	163
13.3	0.0052	162
13.3	0.0052	161
13.5	0.0052	158
13.6	0.0051	156
13.8	0.0050	151
13.9	0.0050	150
13.9	0.0050	150
13.9	0.0050	149
14.1	0.0049	147
14.3	0.0049	143
14.6	0.0048	138
15.3	0.0045	127
15.4	0.0045	126
15.7	0.0044	122
15.9	0.0044	119
16.2	0.0043	115
17.3	0.0040	101
18.0	0.0039	93
18.0	0.0039	93
19.1	0.0036	82
20.7	0.0034	68
22.5	0.0031	55

**Table A-3**  
**Sunnyvale Effluent Mercury Data April 1999 - March 2002**

DATE	Mercury Conc (mg/L)	Monthly Average	
		mg/L	ug/L
04/09/99	0.000004		
04/23/99	0.000009	0.0000065	0.0065
05/07/99	0.000004		
05/21/99	0.000003	0.0000035	0.0035
06/04/99	0.000003	0.000003	0.003
07/09/99	0.000005		
07/23/99	0.000006	0.0000055	0.0055
08/02/99	0.000002	0.000002	0.002
09/01/99	0.000009		
09/16/99	0.000002		
09/20/99	0.000007		
09/23/99	0.000003		
09/24/99	0.000001	0.0000044	0.0044
10/11/99	0.000002		
10/15/99	0.000002	0.000002	0.002
11/04/99	0.000007		
11/23/99	0.000006	0.0000065	0.0065
12/03/99	0.000003	0.000003	0.003
01/11/00	0.000006		
01/25/00	0.000005	0.0000055	0.0055
02/09/00	0.000004		
02/24/00	0.000003	0.0000035	0.0035
03/08/00	0.000005		
03/26/00	0.000004	0.0000045	0.0045
04/13/00	0.000005		
04/18/00	0.000004	0.0000045	0.0045
05/11/00	0.000003		
05/25/00	< 0.000002	0.0000025	0.0025
06/14/00	0.000004		
06/27/00	< 0.000002	0.000003	0.003
07/18/00	0.000003		
07/25/00	0.000007	0.000005	0.005
08/08/00	0.000002		
08/15/00	0.000003		
08/29/00	0.000003	0.0000027	0.0027
09/20/00	0.000003		
09/26/00	0.000004	0.0000035	0.0035
10/12/00	0.000004		
10/25/00	0.000003	0.0000035	0.0035
11/05/00	0.000003		
11/20/00	0.000004	0.0000035	0.0035
12/13/00	0.000002		
12/19/00	0.000006	0.000004	0.004
01/09/01	0.000006		
01/15/01	0.000003	0.0000045	0.0045
02/14/01	0.000002		
02/22/01	0.000003	0.0000025	0.0025
03/05/01	0.000002		

DATE	Mercury Conc (mg/L)	Monthly Average	
		mg/L	ug/L
03/12/01	0.000002	0.000002	0.002
04/02/01	0.000003		
04/24/01	0.000001	0.000002	0.002
05/01/01	0.000001		
05/14/01	0.000009	0.000005	0.005
06/07/01	0.000001		
06/26/01	0.000002	0.0000015	0.0015
07/11/01	0.000002		
07/17/01	0.000006	0.000004	0.004
08/07/01	0.000002		
08/23/01	0.000007	0.0000045	0.0045
09/05/01	0.000002		
09/20/01	0.000004	0.000003	0.003
10/03/01	< 0.000002		
10/23/01	0.000006	0.000004	0.004
11/13/01	0.000004	0.000004	0.004
12/04/01	0.000005	0.000005	0.005
01/10/02	< 0.000008	0.000008	0.008
02/08/02	0.000005	0.000005	0.005
03/07/02	0.000002	0.000002	0.002
# values	68		36
minimum	0.000001		0.0015
maximum	0.000009		0.008
average	0.0000039		0.0039
standard dev.	0.0000020		0.0015

F:\SU32\SU32-29\RPA\effluent limits\[SU Effluent Limits.xls]Hg conc

**Figure A-1**  
**Moving Average Effluent Mass**

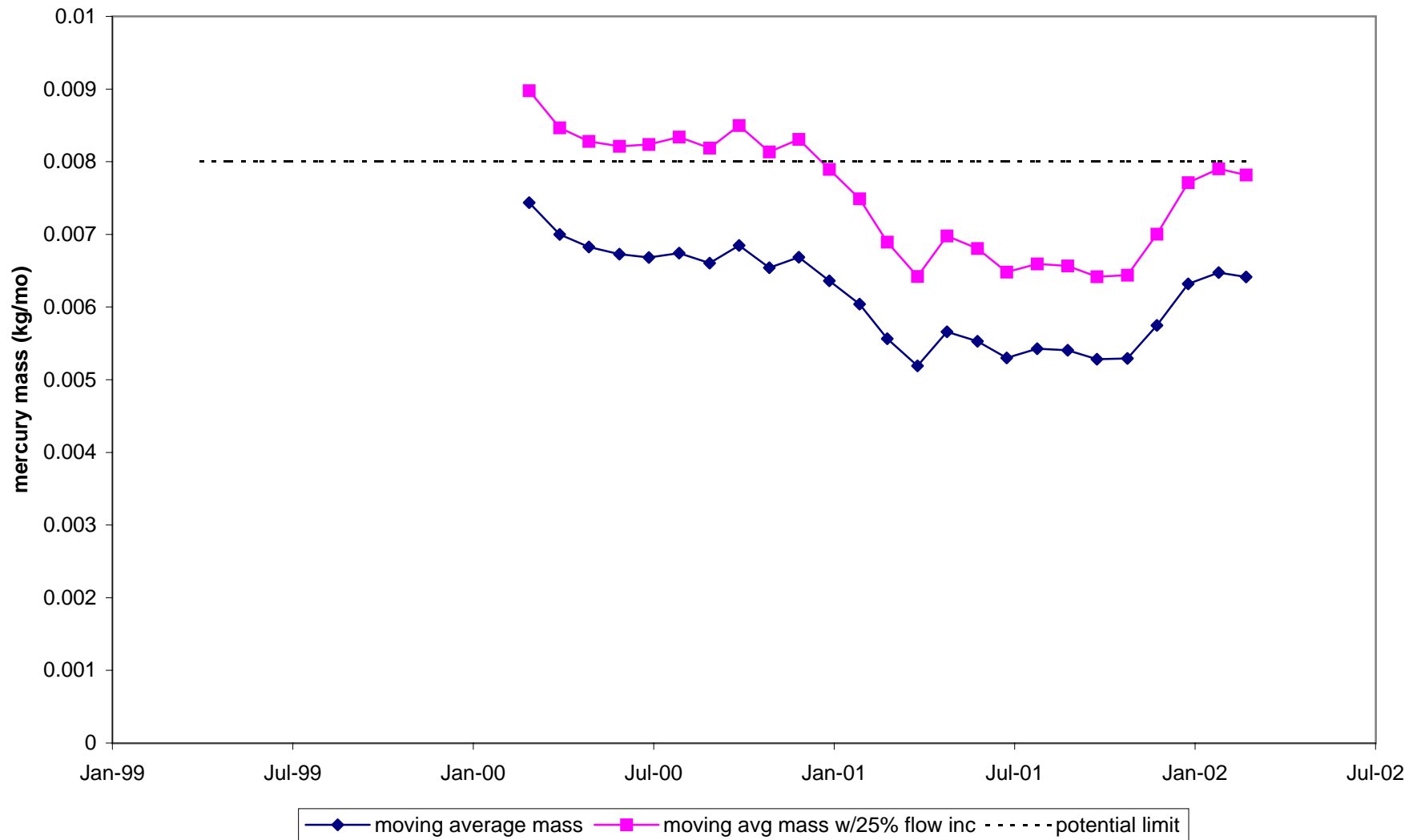


Figure A-2  
Effluent Flow vs Effluent Mercury Concentration

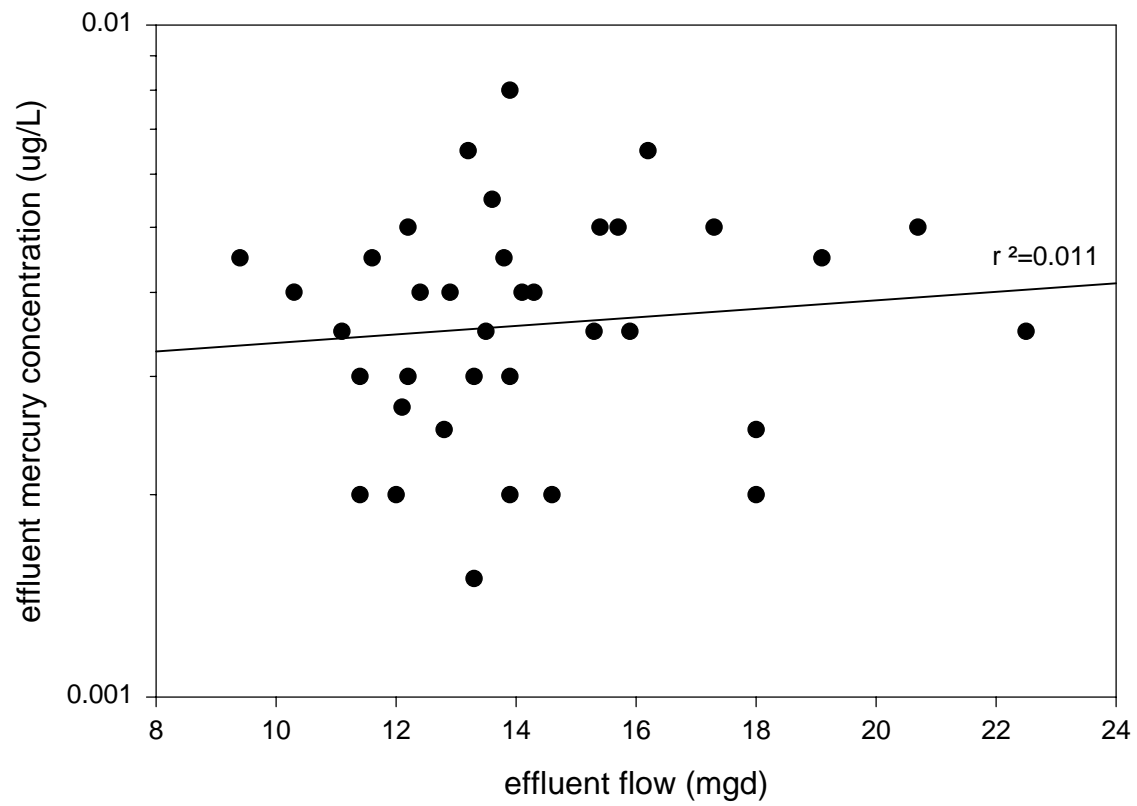
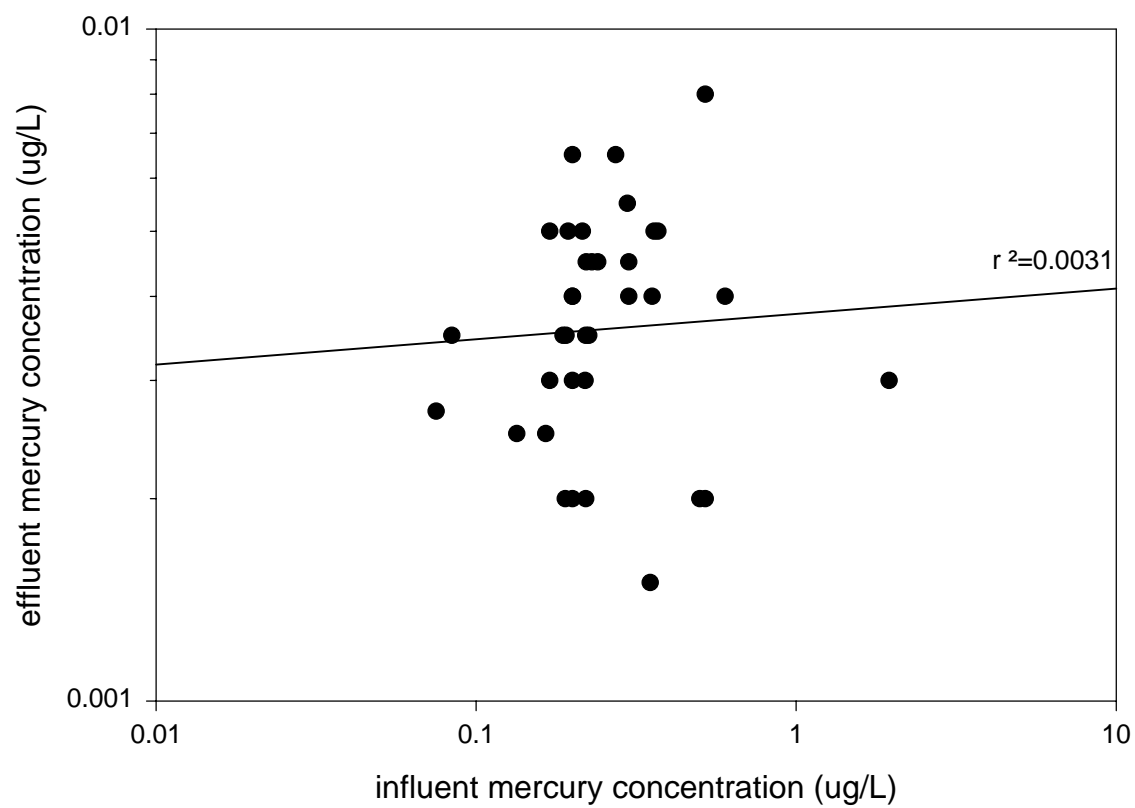


Figure A-3  
Influent Mercury Concentration vs Effluent Mercury Concentration



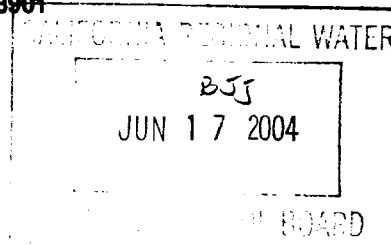


**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION IX**

**75 Hawthorne Street**

**San Francisco, CA 94105-3901**



Mr. Bruce Wolfe  
Executive Officer  
San Francisco Regional Water Quality Control Board  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

Dear Mr. Wolfe:

Thank you for the opportunity to review and comment on the document entitled, "Mercury in San Francisco Bay Total Maximum Daily Load (TMDL) Proposed Basin Plan Amendment and Staff Report," dated April 30, 2004. We reviewed the proposed TMDLs and implementation provisions in the staff report and proposed amendment to determine whether they are consistent with applicable federal regulations concerning TMDLs and NPDES permitting. This letter provides our comments.

We appreciate the Regional Board's hard work to develop the report and proposed amendment. We are pleased to see changes from the previous draft document, and believe the changes enhance the document's scientific basis and reasonableness. For example, the fish tissue numeric target of 0.2 mg/kg will be evaluated using striped bass whose current average concentration is at 0.36 mg/kg; and more and newer data were used to recalculate the waste load allocations for municipal wastewater and industrial dischargers.

However, we are concerned that in their current form, the TMDLs do not appear to meet all federal TMDL requirements. In addition, although we will not be approving or disapproving the implementation provisions for the TMDLs, we are concerned that the proposed implementation provisions addressing NPDES-permitted sources do not appear to be fully consistent with federal permitting requirements. It may be possible for the Regional Board to address some of these concerns by more clearly explaining the proposed decision and its analytical basis; however, some changes in the TMDL and implementation provisions appear to be necessary to ensure full compliance with federal regulatory requirements, as discussed below.

**Concerns About TMDL Provisions**

**1. Compliance with Numeric Water Quality Standards.** Section 303(d) of the Clean Water Act requires that TMDLs be "established at a level necessary to implement the applicable water quality standards." EPA's regulations at 40 CFR 130.7(c) state that "TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical water quality

standards.” The staff report and proposed amendment do not sufficiently demonstrate that the TMDLs will result in attainment of all applicable water quality standards. The Basin Plan numeric water quality objectives for mercury in Table 3-1 indicate that the 0.025 ug/l objective applies as a 4-day average, based on EPA’s “Ambient Water Quality Criteria for Mercury” (EPA, 1984). The EPA guidance upon which this objective is based assumes that the 0.025 ug/l concentration is not to be exceeded more frequently than once every three years as a 4-day average (EPA, 1984, p. 23). The TMDL document does not demonstrate how the numeric Basin Plan objective of 0.025 ug/l as a 4-day average would be attained throughout the affected Bay segments.

**2. Individual Waste Load Allocations.** We are pleased that the proposed Basin Plan amendment appears to include individual waste load allocations (WLAs) for municipal wastewater dischargers, industrial non-refinery dischargers, refinery dischargers and municipal storm water dischargers. Please clarify in the Basin Plan amendment that these individual waste load allocations are being adopted. Inclusion of individual WLAs is a necessary component of a TMDL under 40 CFR 130.2(h), and we emphasize that individual WLAs must remain in the final Basin Plan amendment. We do not consider the inclusion of group WLAs in addition to the individual WLAs to be a barrier to approval of the TMDLs. We do, however, have serious concerns regarding how the Regional Board intends to implement the individual WLAs, which we discuss below under “Concerns About NPDES Permitting Provisions.”

**3. Apparent Allowance for Growth in Industrial Point Source Dischargers.** We understand the Board intends to limit waste load allocations for municipal and industrial wastewater dischargers to current performance levels. EPA supports this approach and believes this is essential since the TMDL document does not demonstrate that increased load can be assimilated.

With regard to refinery and industrial non-refinery dischargers, however, we are concerned that the allocations have been calculated at too high a level as a result of undue rounding. The recalculated refinery current performance level, 0.64 kg/year, was rounded to 1.0 kg/year, and the recalculated industrial non-refinery current performance level, 0.41 kg/year, was also rounded to 1.0 kg/year. The total of the two categories of non-municipal wastewater dischargers, prior to rounding, is 1.05 kg/year; we do not believe that rounding each of the categories to 1.0 kg/year for a total of 2 kg/year for both is necessary or reasonable. We recommend individual WLAs totaling no more than 1.1 kg/year for both categories combined.

Additionally, we reviewed the Board’s responsiveness summary in which the Board discussed several comments submitted by other commenters. In a response to the Waterkeeper’s comments, the Board stated that “Individual (discharger) loads can increase so long as the increase is consistent with the assumptions underlying the TMDL.” We request that the Board clarify the assumptions and requirements associated with the TMDLs and individual WLAs so that it is clear what specific environmental or discharge conditions would need to exist in order for the load from any individual discharge to increase.

The individual and group WLAs can be changed only through formal modifications adopted by the State and approved by EPA. Our expectation is that both the individual and group WLAs will be met.

### **Concerns About NPDES Permitting Provisions**

Although when EPA takes action on the TMDLs, we will not be approving or disapproving the implementation measures, we would like to bring to your attention in summary form, elements of the implementation measures in the proposed Basin Plan amendment with which we are especially concerned. These include:

**1. Absence of Individual Water Quality-Based Effluent Limitations.** It appears that permits will only include a grouped water quality-based effluent limitation (WQBEL), narrative requirements and triggers. Individual water quality-based permit limits are necessary, and if not included, the absence of individual WQBELs would be the basis of an objection to the proposed permit. Individual WQBELs must be enforceable, as discussed below.

NPDES permits must have enforceable WQBELs which ensure attainment of water quality standards. 40 CFR 122.44(d)(1), 122.41(a). WQBELs must be established for each discharge point covered by the permit. 40 CFR 122.45(a). Under 40 CFR 122.44(d)(1)(vii), these effluent limits must comply with all applicable water quality standards and must be consistent with the assumptions and requirements of the individual WLAs in the TMDL. We are concerned with the following language in the staff report, p. 74 (and similar language regarding industrial dischargers): “We propose to implement the total WLA as a group mass limit equivalent to the sum of the individual WLAs... If the annual load exceeds the group mass limit, we will consider enforcement against those facilities that exceeded their individual allocation.” EPA does not object to including a group WQBEL in the permits, as long as the permits also include individual WQBELs consistent with the individual WLAs in the TMDL document. In terms of enforcement, EPA would not object to a two-tier WQBEL enforcement provision under which individual dischargers were deemed to be in compliance with their permit as long as the group limit was met – provided that individual limits are in fact enforceable when the group limit is, if ever, exceeded. We see the Regional Board’s statement that it “will consider” enforcement if the group limit is exceeded as an articulation by the Regional Board of its own enforcement discretion, and we emphasize that this must not be intended or construed as a bar to the enforcement of the individual limits at that time by others, including EPA. We look forward to discussing and working with you on specific watershed permit language concerning this important issue.

**2. Storm Water Provisions.** The Regional Board is commended for establishing numeric WLAs for the urban storm water management agencies, and for setting load reduction targets associated with each of the WLAs. The Regional Board has also set a 20-year time frame for attainment of the WLAs with an interim group loading milestone of 120 kg/year to be attained in 10 years. EPA believes these provisions are consistent with the Clean Water Act and the time

frames appear to be reasonable. EPA does, however, have the following two concerns: EPA believes that allowing, as one of the alternatives for measuring compliance with the WLAs, the use of five-year rolling averages is not consistent with the NPDES regulations. This is discussed further below. The second concern is that the basin plan amendment indicates that only narrative requirements will be included in the implementing NPDES permits, but there is no information showing that these narrative requirements will lead to compliance with the WLAs. The narrative requirements include monitoring, conducting various studies and to "develop and implement mercury source control program." The Regional Board, however, has not identified best management practices (BMPs) nor made a showing the BMPs specified in the amendment are sufficient to implement the WLAs. In implementing numeric WLAs for municipal storm water sources, the Regional Board has the choice of establishing a numeric WQBEL or narrative BMP-based WQBEL. However, if the latter approach is chosen, the permit must show that the BMPs are expected to be sufficient to implement the WLA, and included in the fact sheet and administrative record for the permit. The alternative would be for the Regional Board to make such showing in this basin plan amendment, rather than in each adopted permit.

**3. Averaging Period for Municipal, Industrial and Storm Water Dischargers.** We are pleased to see that the proposed averaging period for compliance with the municipal and industrial wastewater WLAs has been changed from five years to one year. The averaging period for storm water dischargers, however, must be similarly changed from five to one year, as federal permitting regulations at 40 CFR 122.45(d) require compliance with limits based on monthly, daily, and weekly time frames, unless impracticable. There is no discussion in the staff report or proposed Basin Plan amendment of why it might be impracticable to use a shorter, more protective averaging period. There is also no discussion as to how such an averaging period will ensure compliance with the WLAs nor the effect of shorter term spikes that this longer averaging period may allow.

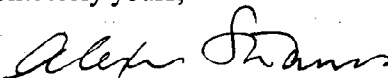
It is also unclear how the one-year averaging period will be assessed. The proposed annual permit limits may be appropriate so long as the permit contains a method for determining compliance with the annual limit. When expressing an effluent limit as an annual value, EPA recommends that the permit provide the ability to assess compliance at interim dates. Permit compliance is regularly determined on a monthly basis, and Discharge Monitoring Reports are prepared and submitted on a monthly basis. We recommend that the Board add specific language to assess compliance on a monthly (or weekly or daily) basis. We would be happy to work with you to develop appropriate language for use in a watershed permit for mercury.

**4. Pollution Prevention Language.** The staff report and proposed Basin Plan amendment indicates that permits will require dischargers to "Develop and implement effective mercury source control programs to minimize significant mercury sources (the level of effort will be commensurate with the discharge volume of the facility)." EPA believes that source control measures are cost-effective means for point sources to limit the discharge of mercury. EPA strongly recommends that all NPDES dischargers be required to implement all feasible source control measures for mercury, regardless of whether the source is "significant" (as you may

define it) or if the facility is a large-volume discharger. In this regard, we recommend the following language, "Develop and implement all feasible and effective mercury source control programs to minimize environmental contamination with mercury." Other areas can be similarly strengthened. We look forward to working with the Board on this and other specific pollution prevention language for the watershed permit for mercury.

In closing, we again commend your staff for their hard work on this particularly difficult project. We are committed to working with you to identify TMDL and implementation approaches that address our shared goals of accomplishing reductions of mercury levels in the Bay while ensuring that legal requirements are met. If you have any questions concerning these comments, please call me at (415) 972-3572 or refer staff to Diane Fleck at (415) 972-3480.

Sincerely yours,



Alexis Strauss  
Director  
Water Division

14 June 2007

**From:** <Smith.DavidW@epamail.epa.gov>  
**To:** <tem@rb2.swrcb.ca.gov>  
**Date:** 7/13/04 10:57AM  
**Subject:** Feedback on Remaining Issues Related to Hg TMDL

Dear Tom:

Thanks very much for meeting with us to discuss the San Francisco Bay mercury TMDL. I am writing to tie up a couple of loose ends concerning topics we discussed.

First, we had discussed the potential inclusion of pollutant trading-type language in the draft watershed permit (par. 8, Adjustment of Individual Mass Limitations). As you will recall, we discussed how that language might relate to the establishment of individual WLAs in the TMDL. Because permit limits need to be consistent with WLAs, changes in the individual mass limits in the permits would not be permissible absent changes in the individual WLAs in the TMDL, and, as we mentioned, any change in WLAs must be done through formal modification of the TMDL. We did mention the possibility that provisions could potentially be included in the TMDL to provide for WLA adjustments following TMDL approval (in order to minimize the workload burden of future basin plan amendments). We said that we would consider whether that might be workable in this instance.

We have carefully reviewed the EPA trading policy and noted EPA's position regarding trading of bioaccumulative toxins such as mercury. The policy states that "EPA does not currently support the trading of pollutants considered by EPA to be persistent bioaccumulative toxics (PBTs)." In light of this pretty unequivocal language, we would recommend against attempting to provide for post-approval adjustments of WLAs in the mercury TMDLs to accommodate trading of mercury discharges. The trading policy also states that "EPA would consider a limited number of pilot projects over the next two to three years to obtain more information regarding trading of PBTs....." (p. 4). As you know, the Sacramento mercury offsets project is underway to help develop this type of information. Perhaps this project will provide useful information to consider in crafting watershed permit provisions and evaluating whether the TMDLs and associated WLAs should be revised in the future.

In addition, you are aware of our concern that there is uncertainty regarding the state of knowledge concerning potential localized levels and effects of mercury in the Bay environment. Given this uncertainty, it probably makes most sense to carefully consider the overall effects of any future revision in the mercury WLAs in the context of the future scheduled overall reviews of the TMDLs that the Regional Board proposes to conduct.

Second, we mentioned that we have some questions and observations concerning the treatment of mercury associated with Bay dredging operations. Here is a brief summary of our questions and concerns, which we would suggest that you review as you consider potential

revisions to the draft TMDL:

1. It appears that the treatment of dredged deposits in the Hg TMDL is not consistent with treatment of dredged deposits in the PCB TMDL. The PCB TMDL sets the allocation for dredged deposits based on dredge spoil volumes projected in the LTMS and the sediment targets set by the TMDL analysis, an approach that appears to be more protective than the approach proposed in the mercury TMDL. The mercury TMDL appears to set a concentration based allocation based on undefined "ambient" concentration. We recommend that you consider whether the mercury TMDL and dredged material allocations should be modified to reflect the more protective approach proposed in the PCB TMDLs.
2. The PCB TMDL analysis properly raises the concern that that disposal of dredged material is likely to spread the previously buried sediments and may result in increased availability of the pollutant. This possibility should also be addressed in the mercury TMDL.
3. It is unclear what "ambient concentration" means in the mercury TMDL. This concept, if retained, should be more carefully defined in the TMDL documents so that it can be implemented effectively in the future.
4. It is unclear whether the treatment of the dredged deposits in the mercury TMDL is consistent with the LTMS.
5. The mercury TMDL appears to allow deposit of dredged material in concentrations greater than the TMDL's numeric sediment target. Why is this permissible and protective? How does this approach ensure that no adverse localized effects will occur in the future as a result of deposition of dredged materials containing mercury concentrations greater than the numeric target?
6. The proposed concentration-based allocation approach may not meet TMDL requirements because this source is not included in the formal TMDL load or wasteload allocations. Under EPA regulations, the TMDL (loading capacity) is the sum of the allocations. This source should be explicitly included in the allocations.
7. Treatment of dredged deposits in the Hg TMDL is not consistent with treatment of air deposition in the same TMDL (where the source is given a mass-based allocation and is included in the TMDL equation, even though evaporation is greater than deposition). Is this difference in approaches reasonable?

We would be happy to further discuss these issues and questions at your convenience if you wish. Thanks again for meeting with us and working to address our remaining concerns.

Best regards,

David Smith  
TMDL Team Leader

P.S. I had on my schedule a call this AM with you, Ken and Tom H. at 10, but nobody was on the line when I called in. Did I miss something here?

CC: <Fleck.Diane@epamail.epa.gov>, <Leith.Suzette@epamail.epa.gov>, <Eberhardt.Doug@epamail.epa.gov>, <Yoshikawa.Nancy@epamail.epa.gov>, <Oda.Terry@epamail.epa.gov>

**From:** "Alexander Wood" <awood@usgs.gov>  
**To:** <bjj@rb2.swrcb.ca.gov>, <rel@rb2.swrcb.ca.gov>  
**Date:** Wed, May 26, 2004 2:01 PM  
**Subject:** Correction to SF MErcury TMDL Report

Hello Bill and Richard,

I had a quick correction to the SF Mercury TMDL report. The reference to the CRWQB 2003 is incorrect. The title of the report by A.Wood, which is myself, is actually: "Cost Data for the Economic Analysis of the Sacramento-San Joaquin Delta Estuary Mercury TMDL". If you could make the correction, that would be great.

Thanks.

Regards,  
-Alex Wood

---

Alexander Wood  
Center for Science Policy (CSP)  
Western Geographic Science Center (WGSC)  
U.S. Geological Survey (USGS)  
345 Middlefield Rd. MS-531  
Menlo Park, CA 94025  
awood@usgs.gov  
ph: (650) 329-4229

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**Western States Petroleum Association**  
Credible Solutions • Responsive Service • Since 1907

Kevin Buchan  
Environmental Coordinator

June 14, 2004

Thomas Mumley  
Planning & TMDLs Division Chief  
California Regional Water Quality Control Board, San Francisco Bay Region  
1515 Clay Street, Suite 1400  
Oakland, CA 94612

RE: WSPA Comments on the Proposed Basin Plan Amendments to  
Incorporate the Mercury TMDL

Mr. Mumley,

The Western States Petroleum Association (WSPA) is a non-profit trade association representing a full spectrum of companies which explore for, produce, refine, transport, and market petroleum products in the six western states.

We offer the comments below on the proposed Basin Plan amendment (BPA). These comments are preliminary and may be augmented by additional comments at a later time due to the continued development of the TMDL and its associated wasteload allocations.

#### **Wasteload Allocation for Industrial Dischargers**

We are concerned about the proposed wasteload allocation (WLA) for the industrial discharger group. The mercury loading contribution by the refiners is insignificant as shown the TMDL. At this time, it is not clear to our members how the proposed aggregate WLA may impact or limit their ability to produce and deliver petroleum fuel products to meet the current and future demand of the California marketplace. As the gap between increasing demand and limited supply widens, both our members and the California Energy Commission are concerned. As a result, we are in the process of developing mercury WLAs for the refiners that we will propose as changes to those found in the Basin Plan amendment. When completed, we will contact you and make arrangements to present our aggregate WLA.

### **Study Requirements**

The requirements and conditions for the refiners as proposed in Appendix A of the BPA seem rather onerous considering that their mercury loading in aggregate is insignificant. We have previously expressed our concerns during public workshops and other meetings on these issues. We believe these requirements are excessive and warrant further discussion between the RWQCB and the refiners. We will be in contact with you to make arrangements for those discussions.

We appreciate the opportunity to provide these comments and look forward to collaborating with you and your staff as the BPA moves forward.

Sincerely,

s/Kevin Buchan  
(sent via email)